

## Preaward Compliance Review Report for All Applicants and Recipients Requesting EPA Financial Assistance

Note: Read Instructions before completing form.

### I. A. Applicant/Recipient (Name, Address, City, State, Zip Code)

Name:

Address:

City:

State:  Zip Code:

B. DUNS No.

II. Is the applicant currently receiving EPA Assistance? ☐ Yes ☒ No

III. List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

n/a

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective actions taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

n/a

V. List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

n/a

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

☐ Yes ☒ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b).

☐ Yes ☐ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. 7.70) applies.

VII. Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its program or activities? (40 C.F.R. 5.140 and 7.95)

☒ Yes ☐ No

a. Do the methods of notice accommodate those with impaired vision or hearing?

☒ Yes ☐ No

b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications?

☒ Yes ☐ No

c. Does the notice identify a designated civil rights coordinator?

☒ Yes ☐ No

VIII. Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. 7.85(a))

☒ Yes ☐ No

IX. Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166)

☒ Yes ☐ No

- X. If the applicant is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.**

Alberder R. Gillespie , Director Labor Standards, Room 233, City Hall/Courthouse 350 South 5th Street,  
Minneapolis, MN 55415, 612-673-3841 alberder.gillespie@minneapolismn.gov

- XI. If the applicant is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet Address for, or a copy of, the procedures.**

yes, <https://www2.minneapolismn.gov/government/departments/civil-rights/>

**For the Applicant/Recipient**

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official

Heather Johnston

B. Title of Authorized Official

City Coordinator

C. Date

03/25/2022

**For the U.S. Environmental Protection Agency**

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statutes and EPA regulations.

A. \*Signature of Authorized EPA Official

B. Title of Authorized Official

C. Date

**\* See Instructions**

Instructions for EPA FORM 4700-4 (Rev. 06/2014)

General. Recipients of Federal financial assistance from the U.S. Environmental Protection Agency must comply with the following statutes and regulations.

Title VI of the Civil Rights Acts of 1964 provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. The Act goes on to explain that the statute shall not be construed to authorize action with respect to any employment practice of any employer, employment agency, or labor organization (except where the primary objective of the Federal financial assistance is to provide employment). Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act provides that no person in the United States shall on the ground of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under the Federal Water Pollution Control Act, as amended. Employment discrimination on the basis of sex is prohibited in all such programs or activities. Section 504 of the Rehabilitation Act of 1973 provides that no otherwise qualified individual with a disability in the United States shall solely by reason of disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Employment discrimination on the basis of disability is prohibited in all such programs or activities. The Age Discrimination Act of 1975 provides that no person on the basis of age shall be excluded from participation under any program or activity receiving Federal financial assistance. Employment discrimination is not covered. Age discrimination in employment is prohibited by the Age Discrimination in Employment Act administered by the Equal Employment Opportunity Commission. Title IX of the Education Amendments of 1972 provides that no person in the United States on the basis of sex shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance. Employment discrimination on the basis of sex is prohibited in all such education programs or activities. Note: an education program or activity is not limited to only those conducted by a formal institution. 40 C.F.R. Part 5 implements Title IX of the Education Amendments of 1972. 40 C.F.R. Part 7 implements Title VI of the Civil Rights Act of 1964, Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act, and Section 504 of The Rehabilitation Act of 1973. The Executive Order 13166 (E.O. 13166) entitled; "Improving Access to Services for Persons with Limited English Proficiency" requires Federal agencies work to ensure that recipients of Federal financial assistance provide meaningful access to their LEP applicants and beneficiaries.

Items "Applicant" means any entity that files an application or unsolicited proposal or otherwise requests EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Recipient" means any entity, other than applicant, which will actually receive EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Civil rights lawsuits and administrative complaints" means any lawsuit or administrative complaint alleging discrimination on the basis of race, color, national origin, sex, age, or disability pending or decided against the applicant and/or entity which actually benefits from the grant, but excluding employment complaints not covered by 40 C.F.R. Parts 5 and 7. For example, if a city is the named applicant but the grant will actually benefit the Department of Sewage, civil rights lawsuits involving both the city and the Department of Sewage should be listed. "Civil rights compliance review" means any review assessing the applicant's and/or recipient's compliance with laws prohibiting discrimination on the basis of race, color, national origin, sex, age, or disability. Submit this form with the original and required copies of applications, requests for extensions, requests for increase of funds, etc. Updates of information are all that are required after the initial application submission. If any item is not relevant to the project for which assistance is requested, write "NA" for "Not Applicable." In the event applicant is uncertain about how to answer any questions, EPA program officials should be contacted for clarification. \* Note: Signature appears in the Approval Section of the EPA Comprehensive Administrative Review For Grants/Cooperative Agreements & Continuation/Supplemental Awards form.



# EPA KEY CONTACTS FORM

OMB Number: 2030-0020  
Expiration Date: 06/30/2024

**Authorized Representative:** *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

<b>Name:</b>	<b>Prefix:</b> Ms.	<b>First Name:</b> Heather	<b>Middle Name:</b>
	<b>Last Name:</b> Johnston	<b>Suffix:</b>	
<b>Title:</b>	City Coordinator		
<b>Complete Address:</b>			
<b>Street1:</b>	350 5th St S. M301		
<b>Street2:</b>			
<b>City:</b>	Minneapolis	<b>State:</b>	MN: Minnesota
<b>Zip / Postal Code:</b>	55415-1314	<b>Country:</b>	USA: UNITED STATES
<b>Phone Number:</b>	612-673-3554	<b>Fax Number:</b>	
<b>E-mail Address:</b>			

**Payee:** *Individual authorized to accept payments.*

<b>Name:</b>	<b>Prefix:</b> Ms.	<b>First Name:</b> Lynn	<b>Middle Name:</b>
	<b>Last Name:</b> Rychly	<b>Suffix:</b>	
<b>Title:</b>	Accountant II /Finance Manager		
<b>Complete Address:</b>			
<b>Street1:</b>	350 5th St S. M301		
<b>Street2:</b>			
<b>City:</b>	Minneapolis	<b>State:</b>	MN: Minnesota
<b>Zip / Postal Code:</b>	55415-1314	<b>Country:</b>	USA: UNITED STATES
<b>Phone Number:</b>	612-673-3850	<b>Fax Number:</b>	
<b>E-mail Address:</b>			

**Administrative Contact:** *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc).*

<b>Name:</b>	<b>Prefix:</b> Mr.	<b>First Name:</b> Josh	<b>Middle Name:</b>
	<b>Last Name:</b> Schaffer	<b>Suffix:</b>	
<b>Title:</b>	Manager, Health Administration		
<b>Complete Address:</b>			
<b>Street1:</b>	350 5th St S. M301		
<b>Street2:</b>			
<b>City:</b>	Minneapolis	<b>State:</b>	MN: Minnesota
<b>Zip / Postal Code:</b>	55415-1314	<b>Country:</b>	USA: UNITED STATES
<b>Phone Number:</b>	612-673-2088	<b>Fax Number:</b>	
<b>E-mail Address:</b>			

# EPA KEY CONTACTS FORM

**Project Manager:** *Individual responsible for the technical completion of the proposed work.*

**Name:** **Prefix:** Ms. **First Name:** Jenni **Middle Name:**

**Last Name:** Lansing **Suffix:**

**Title:** Sr Enviromental Research Analyst-C

**Complete Address:**

**Street1:** 350 5th St S. M301

**Street2:**

**City:** Minneapolis

**State:** MN: Minnesota

**Zip / Postal Code:** 55415-1314

**Country:** USA: UNITED STATES

**Phone Number:** 612-673-3023

**Fax Number:**

**E-mail Address:**

## Other Attachment File(s)

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\* Mandatory Other Attachment Filename:

Add Mandatory Other Attachment

Delete Mandatory Other Attachment

View Mandatory Other Attachment

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To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment

Delete Optional Other Attachment

View Optional Other Attachment

## Project Narrative File(s)

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\* **Mandatory Project Narrative File Filename:**

[Add Mandatory Project Narrative File](#)

[Delete Mandatory Project Narrative File](#)

[View Mandatory Project Narrative File](#)

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To add more Project Narrative File attachments, please use the attachment buttons below.

[Add Optional Project Narrative File](#)

[Delete Optional Project Narrative File](#)

[View Optional Project Narrative File](#)

# BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006  
Expiration Date: 02/28/2022

## SECTION A - BUDGET SUMMARY

Grant Program Function or Activity  (a)	Catalog of Federal Domestic Assistance Number  (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Enhanced Air Quality Monitoring for Communities	66.034	\$	\$	411,170.00	\$	411,170.00
2.						
3.						
4.						
5. Totals		\$	\$	411,170.00	\$	411,170.00

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# SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total (5)
	(1)	(2)	(3)	(4)	
	Enhanced Air Quality Monitoring for Communities				
a. Personnel	\$ 0.00	\$	\$	\$	\$ 0.00
b. Fringe Benefits	0.00				0.00
c. Travel	0.00				0.00
d. Equipment	231,750.00				231,750.00
e. Supplies	0.00				0.00
f. Contractual	126,420.00				126,420.00
g. Construction	0.00				0.00
h. Other	53,000.00				53,000.00
i. Total Direct Charges (sum of 6a-6h)	411,170.00				\$ 411,170.00
j. Indirect Charges					\$
k. TOTALS (sum of 6i and 6j)	\$ 411,170.00	\$	\$	\$	\$ 411,170.00
7. Program Income	\$ 0.00	\$	\$	\$	\$ 0.00

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SECTION C - NON-FEDERAL RESOURCES				
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. Enhanced Air Quality Monitoring for Communities	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00

SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$ 337,530.00	\$ 231,750.00	\$ 68,460.00	\$ 18,760.00	\$ 18,560.00
14. Non-Federal	\$ 0.00	0.00	0.00	0.00	0.00
15. TOTAL (sum of lines 13 and 14)	\$ 337,530.00	\$ 231,750.00	\$ 68,460.00	\$ 18,760.00	\$ 18,560.00

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT				
(a) Grant Program	FUTURE FUNDING PERIODS (YEARS)			
	(b)First	(c) Second	(d) Third	(e) Fourth
16. Enhanced Air Quality Monitoring for Communities	\$ 337,530.00	\$ 73,440.00	\$ 200.00	
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	\$ 337,530.00	\$ 73,440.00	\$ 200.00	

SECTION F - OTHER BUDGET INFORMATION	
21. Direct Charges:	22. Indirect Charges:
23. Remarks:	

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## Application for Federal Assistance SF-424

\* 1. Type of Submission:

- ☐ Preapplication  
☒ Application  
☐ Changed/Corrected Application

\* 2. Type of Application:

- ☒ New  
☐ Continuation  
☐ Revision

\* If Revision, select appropriate letter(s):

\* Other (Specify):

\* 3. Date Received:

03/25/2022

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

### State Use Only:

6. Date Received by State:

7. State Application Identifier:

Choose State...

### 8. APPLICANT INFORMATION:

\* a. Legal Name:

City of Minneapolis

\* b. Employer/Taxpayer Identification Number (EIN/TIN):

41-6005375

\* c. Organizational DUNS:

0665304110000

### d. Address:

\* Street1:

350 5th St S. M301

Street2:

\* City:

Minneapolis

County/Parish:

Hennepin

\* State:

MN: Minnesota

Province:

\* Country:

USA: UNITED STATES

\* Zip / Postal Code:

55415-1314

### e. Organizational Unit:

Department Name:

Health Department

Division Name:

### f. Name and contact information of person to be contacted on matters involving this application:

Prefix:

Mr.

\* First Name:

Josh

Middle Name:

\* Last Name:

Schaffer

Suffix:

Title:

Manager - Health Administration

Organizational Affiliation:

City of Minneapolis

\* Telephone Number:

541-410-3351

Fax Number:

612-673-8666

\* Email:

josh.schaffer@minneapolismn.gov

## Application for Federal Assistance SF-424

### \* 9. Type of Applicant 1: Select Applicant Type:

C: City or Township Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

\* Other (specify):

### \* 10. Name of Federal Agency:

Environmental Protection Agency

### 11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities  
Relating to the Clean Air Act

### \* 12. Funding Opportunity Number:

EPA-OAR-OAQPS-22-01

\* Title:

Enhanced Air Quality Monitoring for Communities

### 13. Competition Identification Number:

Title:

### 14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment

Delete Attachment

View Attachment

### \* 15. Descriptive Title of Applicant's Project:

Minneapolis Enhanced Air Quality Monitoring

Attach supporting documents as specified in agency instructions.

Add Attachments

Delete Attachments

View Attachments

**Application for Federal Assistance SF-424****16. Congressional Districts Of:**

\* a. Applicant

005

\* b. Program/Project

005

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment

Delete Attachment

View Attachment

**17. Proposed Project:**

\* a. Start Date:

01/01/2023

\* b. End Date:

07/01/2025

**18. Estimated Funding (\$):**

\* a. Federal

411,170.00

\* b. Applicant

0.00

\* c. State

0.00

\* d. Local

0.00

\* e. Other

0.00

\* f. Program Income

0.00

\* g. TOTAL

411,170.00

**\* 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**☐ a. This application was made available to the State under the Executive Order 12372 Process for review on☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.☒ c. Program is not covered by E.O. 12372.**\* 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**☐ Yes☒ No

If "Yes", provide explanation and attach

Add Attachment

Delete Attachment

View Attachment

**21. \*By signing this application, I certify (1) to the statements contained in the list of certifications\*\* and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances\*\* and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ \*\* I AGREE

\*\* The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

**Authorized Representative:**

Prefix:

Ms.

\* First Name:

Heather

Middle Name:

\* Last Name:

Johnston

Suffix:

\* Title:

City Coordinator

\* Telephone Number:

6126733241

Fax Number:

\* Email:

heather.johnston@minneapolismn.gov

\* Signature of Authorized Representative:

Heather Johnston

\* Date Signed:

03/25/2022



March 18, 2022

Re: Comprehensive Community Air Monitoring in Minneapolis  
U.S. EPA grant proposal

To Whom It May Concern:

Environmental Initiative supports and will work with project partners to further the goals of this vital regional collaboration. This project will provide health, environmental, and community quality of life co-benefits. This effort will build important relationships between the public, private, and community partners that will help with this project, but also establish a foundation for future related air quality, health, and community endeavors.

Two Environmental Initiative programs will provide direct project assistance in implementation, community engagement, information dissemination, and education on related issues with leaders in environmental, health, business, and civic arenas. Project Safety NET (Neighborhoods Empowering Teens) is an annual environmental justice internship for a cohort of North Minneapolis youth. This effort partners with public, private, and nonprofit organizations to:

- Integrate young people in local efforts to address environmental justice issues.
- Foster environmental literacy and practical skills of young people to create a new generation of environmental stewards.
- Increase exposure to and interest in careers related to the environment, sustainability, and green enterprises.

Clean Air Minnesota (CAM) is a diverse group of public, private, and community people and organizations working to develop, fund, and implement voluntary projects that reduce air pollution. CAM partners also assist the MPCA in administering elements of Minnesota's participation in the EPA Advance Program. CAM partners also partner with the Public Policy Project's Environmental Justice Coordinating Council (EJCC) in North Minneapolis. This is a proven, powerful combination working to improve air quality and provide local and public health benefits in North Minneapolis. These unique partnerships with this grant's improved monitoring and outreach capacity will bring improved public health in over-burdened communities through increased awareness of and adoption of new operational practices to reduce pollutants. This pairing also gives all members and partners greater understanding of barriers to and opportunities for working more closely on successful pollution prevention efforts with businesses, government, and communities.

We stand ready to engage in and support this project. Please contact me with any questions.

Respectfully,

A handwritten signature in dark ink, appearing to read "William J. Droessler".

William J. Droessler  
Partnership Development Officer

March 23, 2022

Minneapolis Health Department  
c/o: Jenni Lansing  
Public Service Building  
505 Fourth Ave. S., Room 520  
Minneapolis, MN 55415

Dear Ms. Lansing,

I write on behalf of the Minneapolis Sustainability Division and Green Zones advisory committee members in support of the City of Minneapolis Health Department's proposal to the EPA for a grant to fund the Minneapolis Community Air Monitoring project to study and reduce volatile organic compounds (VOCs) in environmental justice communities of Minneapolis. We strongly support this grant application and the focus on working collaboratively with impacted community members, organizations and residents to collect data, educate fellow community members and identify evidence-based interventions.

The Minneapolis Sustainability Division facilitated the development of the Green Zones initiative in response to calls to action from environmental justice leaders in Minneapolis and Minnesota. For six years, staff have worked with marginalized and resilient community organizers and residents to assemble 5-year work plans, convene critical conversations and advance community-based projects with funding and in-kind support. The Community Air Monitoring project is a critical project for advancing several goals in the Green Zones' work plans related to air pollution, community education, and government accountability.

Should EPA choose to fund this project, we would expect Green Zones advisory committee members (with support from the Sustainability Division) to:

- Regularly attend and actively participate in Community Air Monitoring meetings;
- Host air monitors and records observations of odors, smoke, and activities contributing to hyper local air pollution;
- Identify community-based organizations who have trusted relationships and broad networks to reach residents in Green Zones and other EJ areas; and
- Ground-truth findings, support the development of insights and contribute to the development and implementation of solutions to local air pollution.

We look forward to working with you to advance the education, engagement and empowerment of impacted community members around air pollution data and communications. If you have any questions please contact me at 612-673-3014 or [kelly.muellman@minneapolismn.gov](mailto:kelly.muellman@minneapolismn.gov).

Sincerely,



Kelly Muellman  
Sustainability Program Coordinator  
Sustainability Division  
City of Minneapolis



*Protecting, Maintaining and Improving the Health of All Minnesotans*

March 21, 2022

Minneapolis Health Department  
c/o Jenni Lansing  
Public Service Building  
505 Fourth Ave. S., Room 520  
Minneapolis, Minnesota 55415  
Dear Ms. Lansing:

I write on behalf of the Minnesota Department of Health, Environmental Health Division (MDH EH) in support of the City of Minneapolis Health Department's proposal to the U.S. EPA for a grant to fund the Minneapolis Community Air Monitoring project to study and reduce volatile organic compounds (VOCs) in environmental justice communities of Minneapolis. We strongly support this grant application and the focus on working collaboratively with impacted community members and organizations to collect data, educate fellow community members and identify evidence-based interventions.

As an agency which has worked closely with Minneapolis to address air pollution, including air toxics such as tetrachloroethylene, a common dry cleaning solvent, we share the goal of reducing human exposure to toxic chemicals in the ambient air. Through this letter, we acknowledge specific roles and responsibilities we will fulfill in this partnership. In the event this proposal is funded, we would expect our role in the Minneapolis Health Department's project to include:

- Providing technical assistance and expertise on health outcomes related to air pollutants;
- Sharing best practices communication language on health outcomes and disparities related to air pollution; and
- Identifying health risk levels for acute and chronic exposures to different air pollutants, and assisting in risk assessment activities.

We look forward to working with you to advance the education and engagement of impacted community members around air pollution data and communications, and in working towards evidence-based mitigation of air toxics pollution. If you have any questions please contact me at 651-201-4910, or [james.kelly@state.mn.us](mailto:james.kelly@state.mn.us).

Sincerely,

A handwritten signature in black ink that reads 'James Kelly'.

James Kelly, M.S., Manager  
Environmental Surveillance & Assessment  
Environmental Health Division  
Minnesota Department of Health

*An equal opportunity employer.*

ED\_013931A\_00000717-00001



## Guidance for QA/QC of AQMesh pod/sensor data

### Purpose:

This document outlines guidance for qualifying and invalidating AQMesh pod and sensor ambient measurement values so those used in ambient air quality analyses reflect actual ambient air quality at pod locations.

### When to apply qualifiers and/or null data codes:

A qualifier code or null data code should be applied to any sample value for which there is evidence to suggest that the sample value *does not reflect the actual ambient air concentration* in the neighborhood of the pod. Evidence can include extremely high measurements that are isolated, increases or decreases in sample measurements that reflect a sudden change in air quality extremely unlikely to occur in real life, missing results around abnormal measurements which suggest pod/sensor malfunction, and prolonged periods of extremely high measurements not explained by a real-world event. Other information such as meteorology, local and regional events, and site knowledge are also factors to consider when determining whether to apply a qualifier or null data code.

- A qualifier code should be added to a sample result if it is questionable whether or not that result reflects the actual ambient air quality at the location and time.
- A null data code should be applied when there is strong evidence to suggest that a sample result does not reflect actual ambient air quality.
- An informational qualifier should be applied when a sample result reflects actual ambient air quality, but is considered to be caused by an anomalous event.

For ambient air quality analysis, values with a null data code are always excluded while values with a qualifier code or informational qualifier code may or may not be excluded at the analyst's discretion. Application of the null code only nulls out the "final value". The original measured value and the adjusted value remain in place.

### Which qualifier / null data / informational qualifier codes to apply:

- Use a null data code if strong evidence (multiple pieces of information calling a value into question):
  - Common null data codes are:
    - **AV, Power Failure:** Use if a value is missing because the pod lost power or if a value is erroneous due to a pod recently regaining power.
    - **BA, Maintenance / Routine Repairs:** Use if a value is missing or erroneous because an operator was performing maintenance on the pod at the time
    - **AN, Machine Malfunction:** Use if a value is missing or erroneous, but exact cause of the result being missing or erroneous is unknown (the pod/sensor diagnostics do not flag the result).

- **QX, Does not meet QC criteria:** Null data codes should replace the QX qualifier code when values are extreme and the analyst determines the value should not be used for summarizing air quality under any circumstances. The QX qualifier\_code is hard-coded in the auaq\_hourly\_value table to indicate the presence in the 15-minute or 1-minute data—that comprise the 1-hour value—values that are above the manufacturer’s range. The QX qualifier\_code cannot (and should not) be added manually through the QA\_tool.
- Use a qualifier code\* if moderate evidence (one piece of information calling a value into question):
  - Common qualifier codes are:
    - **NS, Influenced by nearby source:** Use when a value is affected by a nearby source that is specifically affecting the air quality next to the pod (i.e. an idling vehicle). Do not use if the source is affecting air quality more broadly around the area of the pod (i.e. a fire).
    - **VB, Value below normal;** no reason to invalidate: Use when a value is unusually low, but there is no other reason to suspect the result is erroneous.
    - **5, Outlier:** Use when a value is extremely low or high, but no real-world explanation for why value is low or high.
- Use an informational qualifier code\* if the value is unusual, but there is an anomalous event that suggests the value reflects the actual air concentration:
  - Common informational qualifier codes in MN are:
    - **IF, Fire – Canadian:** Use when high values are due to wildfires in Canada
    - **IH, Fireworks:** Use when high values are caused by fireworks (i.e. 4<sup>th</sup> of July)
    - **IJ, High Winds:** Use when high winds cause elevated PM levels due to fugitive dust, etc.
    - **IM, Prescribed fire:** Use when a prescribed fire in MN or other state causes high values.
    - **IP, Structural Fire:** Use when high values are caused by a burning building, etc.
    - **IT, Wildfire U.S.:** Use when high values are caused by a wildfire in the U.S.
    - **J, Construction:** Use when building or highway construction causes high values.

\* EITHER a qualifier code OR an informational code can be added, not both. Priority is for the code supported by the weight of evidence.

March 22, 2022

Minneapolis Health Department  
c/o: Jenni Lansing  
Public Service Building  
505 Fourth Ave. S., Room 520  
Minneapolis MN 55415

Dear Jenni Lansing:

I am writing on behalf of the Minnesota Pollution Control Agency (MPCA), Air Assessment Section in support of the City of Minneapolis Health Department's proposal to the U.S. Environmental Protection Agency (EPA) for a grant to fund the Minneapolis Community Air Monitoring project to study and reduce volatile organic compounds (VOCs) in environmental justice communities of Minneapolis. We strongly support this grant application and the focus on working collaboratively with impacted community members, organizations and residents to collect data, educate fellow community members and identify evidence-based interventions. We look forward to partnering with the City of Minneapolis.

The MPCA is a state agency committed to ensuring that every Minnesotan has healthy air, sustainable lands, clean water, and a better climate. The MPCA addresses statewide inequities in pollution exposure through its work to ensure that Black, Indigenous, communities of color, and low-income residents enjoy a healthy environment and fair treatment with respect to the development, adoption, and enforcement of environmental laws, regulations, and policies. This includes meaningful engagement with communities most impacted by pollution and programs intended to protect against it. The MPCA has collaborated with the City of Minneapolis in the past with air monitoring projects. Two recent notable projects include the

- *Assessing Urban Air Quality* (Financial support for this project is provided by the Environment and natural resources trust fund Subd. 07 Air Quality, Climate Change, and Renewable Energy ENRTF # 07b): (Grant period July 1, 2017 – June 30, 2021, Grant amount: \$700,000). MPCA has met all the project deadlines and has submitted all the required reports.
- *Calibration of Concern for Polycyclic Aromatic Hydrocarbons Using Monitoring and Modeling, Community Scale Air Toxics Grant (CSATM), XA00E00976*: (Grant period February 1, 2012 – June 30, 2016, Grant amount: \$555,720). MPCA has completed this grant on schedule and under budget. The work products met the expectations of this grant and reporting results to EPA were all within all applicable deadlines.

Through this letter, we acknowledge specific roles and responsibilities we will fulfill in this partnership. In the event this proposal is funded, we would expect our role in the Minneapolis Health Department's project to include:

- Provide expertise on air sensor technology that will be used in this project.
- Provide the City of Minneapolis AQ MESH sensors that the MPCA has in house.
- Assist with data access from AQ MESH sensors.
- Assist with data interpretation, visualization and communication to community members and interested groups.
- Assist in articulating health risk levels for acute and chronic exposures to different air pollutants.
- Technical advice and assistance.

We look forward to working with the Minneapolis Health Department to monitor the air quality in Minneapolis, particularly using the power of sensor technology to better understand potential disproportionate impacts.

Sincerely,

*Kari Palmer*

*This document has been electronically signed.*

Kari Palmer, Manger  
Air Assessment Section  
Environmental Analysis and Outcomes Division

KP:je

### Quality Assurance Plan – AQMesh

This project plan outlines and documents the quality check and control methodologies and strategies applied to assuring the data from AQMESH sensors are accurately reporting and recorded data is reflective of proper functionality of the instrument. The document will list the quality improvement procedures that will be applied to the data, persons responsible for implementing the same and references.

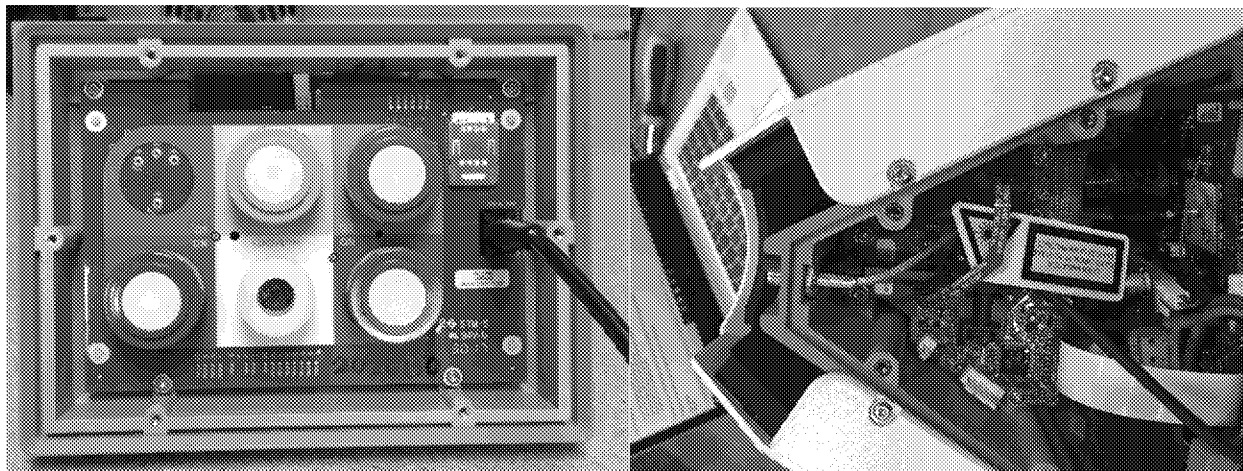
When edits to methodology or personnel are made on this document, the date, person who made the changes and version number will be recorded in the table on the last page. The current version number will also be updated in the header.

AQMesh sensors are a multi pollutant sensor monitoring system. AQMesh is an air quality monitor manufactured in the UK and supported worldwide through a global network of distributors. It has been designed to offer a robust and easy-to-use air quality monitoring system that can deliver localised real-time readings, improving the scope and accuracy of gathering air quality data in order to support initiatives to reduce air pollution and its risk to human health. The pollutants monitored for the current configuration for the LCCMR, Urban Air project are:

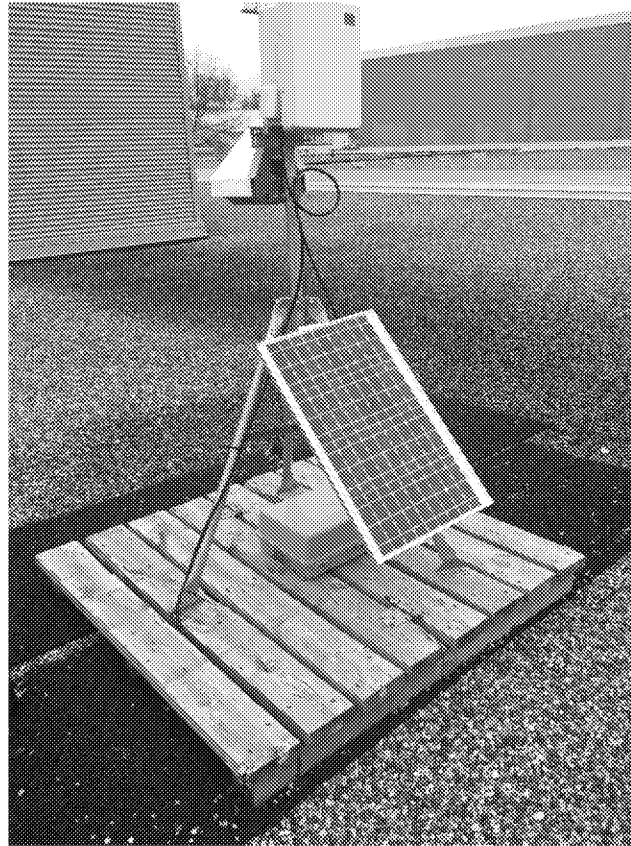
- Carbon monoxide (CO)
- Nitrogen dioxide (NO<sub>2</sub>)
- Nitric Oxide (NO)
- Ozone (O<sub>3</sub>)
- Sulphur dioxide (SO<sub>2</sub>)
- Fine particles (PM<sub>2.5</sub>)
- Coarse particles (PM<sub>10</sub>)

In addition to these NO<sub>x</sub> is also reported as a calculated sum of NO and NO<sub>2</sub>. Relative humidity and Pod temperature are also measured.

Each AQMesh pod consists of 5 electrochemical gas sensors, a PM laser and PM pump, humidity and RH sensor.



Each pod is power by a solar panel which in turn is connected to 4 Pb batteries.



**Principal of operation:**

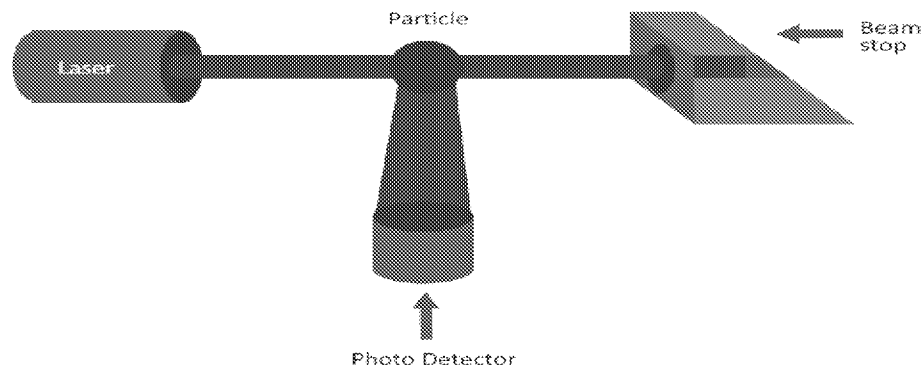
**Electrochemical sensors:**

AQMesh uses electrochemical sensors designed for measurement of a range of gaseous species at ppb levels. The innovative sensor design allows AQMesh to mitigate the effects from environmental factors such as temperature and humidity.

Electrochemical sensors work by reacting to the target gas, generating an electrical output which varies with the amount of target gas present. The innovative difference in the new sensors is their fourth electrode. This is embedded in the sensor electrolyte allowing the reaction from environmental effects to be measured without the effects from the target gas AQMesh, using these two outputs from the sensor, applies an algorithm to produce an accurate ppb value for the target gas.

Electrochemical sensors are susceptible to interference from multiple conditions found in the ambient environment, including temperature, humidity and cross gas effects. The AQMesh algorithms are developed for individual sensor types and are specifically designed to compensate for these environmental variables to provide the best possible precision and accuracy of measurement. Current version of the algorithm used is V5.1

## ASSESSING URBAN AIR - AQMESH QAPP

**Optical Particle counter:**

The AQMesh optical particle counter works by drawing a sample of air through the system via a pump. The gas sample, containing particulate matter, falls through the path of an internally mounted and optically focused laser. The path of this laser is deflected as an individual particle is hit by the laser. This deflection is detected by an optical sensor which counts the number of deflections as particles. At the same time the particle diameter is determined allowing the counts to be sorted into size defined bins. Using these size specific bins, along with assumptions that all particles measured are spherical and have a standardized density, allow the accurate estimation of particle mass. This can then be broken down into the PM<sub>1</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> fractions.

Due to the AQMesh particle counter inlet not being heated to dry the air sample taken, all particles including water droplets will be counted and sized from within the air sample at the ambient temperature and humidity.

As such, variation in particle type, i.e. hygroscopic or hydrophobic particles, or density variation, can also affect consistency of results in comparison to equivalence methods.

Current version of algorithm used is v3.0

Latest version of software update to pods for over writing the voltage drops to get continuous PM data is v3.37.405.hex (12/9/2019)

The sampling interval for all measurement types is broken down into 3 levels. For environmental parameters and gas sensors this is split into:-

P1 – Sample interval Frequency of sample taken, e.g. 10 seconds

P2 – Interval averaging Time period samples are averaged out to, e.g. 15 minutes

P3 – Transmission interval Frequency of raw signals being sent to the AQMesh server

This process is similar for the particle counter, however slightly different:-

T1 – Sample duration Pump run time for the sample

T2 – Sample interval Period of time between pump start times

T3 – Transmission interval Frequency of raw signals being sent to the AQMesh server

**Technical specifications of sensors and features of pod:**

- ppb measurement of gases
- 24 month sensor warranty
- Wireless GSM communications
- Automatic GPS location
- Rugged, waterproof IP65 case
- Data is automatically downloaded to secure server @ aqmeshdata.net

- Data downloaded from server to MPCA WAIR database via API
- 4 electrode alphasense gas sensors
- Gas measurements are recorded every 15 minutes and PM measurements are recorded every one minute
- All gas sensors are calibrated and tested before shipping and a slope of 1 and offset of 0

### Sensor detection limits

Parameter	Lower limit of detection	Upper limit of detection	Unit
Size range	0.3	30	µm
PM10	N/A	500	µg/m <sup>3</sup>
PM2.5	N/A	1000	µg/m <sup>3</sup>
Nitric oxide (NO)	5	4000	ppb
Nitrogen dioxide (NO <sub>2</sub> )	10	4000	ppb
Oxides of Nitrogen (NO <sub>x</sub> )	10	8000	Ppb
Carbon monoxide (CO)	5	6000	ppb
Sulphur dioxide (SO <sub>2</sub> )	10	10,000	ppb
Ozone	5	1800	ppb

*Table 1: AQMESH parameter and detection limits from manual*

### QA STEPS:

Data from the AQMesh server is downloaded to MPCA WAIR database via API

On the AQMesh server:

- Data field is blank when data is not being transmitted either due to signal issues or other technical problems
- In the event of a sensor failure, data field is also blank from the date that the failure was recorded to when it gets replaced with a new sensor



- Once replaced, sensor status shows as stabilizing, followed by rebasing before the status changes to reading and then the data field starts to get populated again

In an attempt to remove obvious outlying data points which can be identified by the AQMesh server, data points which meet these criteria will be replaced by a coded value so that it is obviously marked as incorrect. The following table explains the codes used and under what circumstances the post algorithm value may be returned to the downloadable dataset.

Code	Label	Description	Long term effects
-999	Stabilisation	Period of 2 days from installation of a new sensor which needs to settle in its new environment	Data classified as stabilising will remain as non-viewable.
-998	Rebasing	Typically, this is a 2-day period where local variables are calculated for use in the AQMesh algorithm are found	During the period the coded flag will remain, however upon completion of this process, valid data will write over the code.
-996	Sensor Failure	In the event of a sensor failure, all post algorithm results will be removed from view as the data is classed as erroneous	Data from a failed sensor will remain as non-viewable
-995	Cross Gas Error	If a sensor fails which is relied upon for the removal of interferences on another, data from the reliant sensor becomes invalid	Data will remain as non-viewable until compensating sensor is replaced and producing good results.

*Table 2: AQMesh qualifier codes and descriptions*

When the data come in to WAIR, all the above codes that AQMesh applies will show up on our end as null data.

In addition to the above, there are additional QA criteria applied on the WAIR database that is maintained at MPCA. Below are the QA codes and other info as applied to WAIR.

Table of parameter codes, ranges and AQMESH method description:

parm_c ode	method_c ode	collect_desc	analysis_desc	range_ min	range_ max
42101	9016	AQMesh Alphasense electrochemical sensor CO- B4	AQMesh protocol v5.1	0	6000
42401	9017	AQMesh Alphasense electrochemical sensor SO2- B4	AQMesh protocol v5.1	-10	10000
42601	9018	AQMesh Alphasense electrochemical sensor NO- B4	AQMesh protocol v5.1	-5	4000
42602	9019	AQMesh Alphasense electrochemical sensor NO2- B43F	AQMesh protocol v5.1	-10	4000
44201	9020	AQMesh Alphasense electrochemical sensor OX- B431 & NO2-B43F	AQMesh protocol v5.1; difference OX & NO2	-10	1800
85101	9006	AQMesh optical particle counter PM 10	Light-scattering laser photometer v3.0	0	1000
88101	9006	AQMesh optical particle counter PM 2.5	Light-scattering laser photometer v3.0	0	500
88999	9006	AQMesh optical particle counter PM 1	Light-scattering laser photometer v3.0	0	200

Table 3: WAIR parameter codes, ranges and method description

aqmesh_code	qual_code	qual_desc	qual_desc_long
-1000	ZA	Not Fitted	Sensor or component not fitted in Pod
-999	ZB	Stabilizing	Sensor stabilizing over 2-day period likely after recent POD move to new location or manually instigated from the server
-998	ZC	Rebasing	Local variables calculated over 2-day period for use in AQMesh algorithm. Valid data to over-write qual_code upon completion. Signal to re-retrieve data.
-996	ZD	Failed	System detected sensor failure
TBC	ZE	TBC	Something gone wrong or configuration process not followed. Readings may have returned in a pre-stabilization period.
-995	ZF	Cross Gas Error	Failure of another sensor relied upon for removal of interferences on sensor.
-994	ZG	No Data	Data point where instrument has not recorded a reading
-993	ZH	Destabilised	Sensor compromised due to odd fluctuations in temperature and pressure
-992	ZI	Extreme Environment	Extreme climate conditions in which electrochemical sensors do not provide consistent output
-991	ZJ	Condensation	Condensation on NDIR sensor detector
-899	ZK	Deliquescence	Outlying data caused by hygroscopic particle size growth when not using heated inlet option. Removed following analysis of particle count distribution
-898	ZL	Pump Fail	Pump used for drawing sample through optical chamber stopped working
-897	ZM	Dirty Optics	Optical sensor used to count and size particles became blocked or dirty and requires cleaning
-896	ZN	Laser Fail	Laser used to detect particles has stopped working

-895	ZO	Warm-Up	Inlet heater warming to required temperature. Sample may be affected by deliquescence
-894	ZP	RF Pick up	Sample affected by RF pick up likely caused by nearby electrical equipment
-893	ZQ	Mis-read	Particle counter mis-read

*Table 4: Null qualifier codes on WAIR from AQMesh and description*

**Document version changes:**

<b>Modified date</b>	<b>Modified by</b>	<b>Reason for change</b>	<b>Version #</b>
4/15/2019	Monika Vadali	First draft of document	V 1.0
12/2/2019	Monika Vadali	Additional QA/QC parameters and outlier id	V 1.1
12/2/2019	Monika Vadali	Table 3, 4	V 1.1

## I. Cover Page

**Project Title:** Comprehensive community air toxics monitoring, education, and engagement in Minneapolis

**Applicant Information:** City of Minneapolis Health Department  
505 Fourth Ave S, Room 520  
Minneapolis, MN 55415

**Primary Contact:** Jennifer Lansing, MS, REHS, Senior Environmental Research Analyst  
612-709-9977  
[Jenni.lansing@minneapolismn.gov](mailto:Jenni.lansing@minneapolismn.gov)

**DUNS number:** UEI number ZEL3HB6H7B24

**Set-Aside:** No set aside

**Brief Description of Applicant Organization:** The Minneapolis Health Department (MHD) is the local public health agency for the City of Minneapolis. It delivers public health interventions directly and in partnership with community, government, and other public health entities. MHD's mission is to improve the quality of life for all people in the City by protecting the environment, preventing disease and injury, promoting healthy behaviors, and creating a City that is a healthy place to live, work, and play.

**Project Partner(s) (if applicable):** The Minnesota Pollution Control Agency, the Minnesota Department of Health, and the City of Minneapolis Sustainability Division in partnership with the Minneapolis Green Zones Initiative Advisory Committee.

**Project Location:** City of Minneapolis, priority for Green Zones environmental justice areas (zip codes 55407, 55404, 55454, 55408, 55411, 55412, 55418, 55413).

**Air Pollutant Scope:** The focus of the application is identifying speciated volatile organic compounds (VOCs) using EPA Air Method, Toxic Organics-15 (TO-15).

**Budget Summary:**

EPA funding requested	Total project cost
\$411,170	\$411,170

**Project Period:** 2.5 years starting January 1, 2023 to July 1, 2025

**Short Project Description:** The City of Minneapolis ("the City") will collaborate with community members from Green Zones environmental justice neighborhoods, community-based organizations, residents, and educators to: 1) monitor for exposures to VOCs and other pollutants from industrial and residential activities as well as traffic, 2) develop air quality curriculum, outreach materials, and hands on activities with air sensors as well as understanding and interpreting air sensor data, and 3) increase understanding of hyper local air pollution sources and strategies to mitigate air pollution in environmental justice communities.

## **II. Workplan:**

### **Section 1 – Project Summary and Approach**

#### **A. Overall Project**

The City will address air pollution concerns raised by residents and organizers in Minneapolis Green Zones environmental justice neighborhoods. Resources will be used to 1) characterize ambient air concentrations of VOCs of concern using a combination of sensor technology as well as passive sampling methodology using Summa canisters and 2) engage and educate concerned residents about the data collected and opportunities to improve air quality. The study area is the City of Minneapolis with focus on the two Green Zones areas that are designated as Environmental Justice areas (Figure 1).

#### ***Step 1 – Preproposal work***

The City began meeting with Green Zones advisory committee members and residents of the Green Zones in fall 2021 to plan for a community air monitoring project. Initial conversations have been focused on identifying 1) areas and chemicals of concern for air pollution, including specific locations (intersections/addresses), 2) residents, schools, and businesses to host air sensors, and 3) the type of air sensors needed to monitor pollutants of concern.

In spring 2022, community members will determine final locations of air sensors, based on their lived experiences in their neighborhoods and local activities that they observe as deterrents to their quality of life. Two types of air sensors have been identified for initial screening: PurpleAir sensors will be used for particulate matter (PM<sub>2.5</sub>) monitoring and AQMesh sensors will be used to monitor gases (NO<sub>2</sub>, NO, O<sub>3</sub>, CO, and total VOCs) and particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>). Surrounding sources like location of heavy traffic roads, freeways, green spaces and parks, proximity to industrial facilities, businesses, parking lots, etc. are all being taken into consideration when deciding the final monitor type.

#### ***Step 2 – Speciated VOC sampling***

If awarded funding, resources from this EPA opportunity will enhance the preproposal work and respond to the community's need for more data on air toxics exposures, in particular VOCs. With this awarded funding, each month, for 21 months, 30 Summa canisters with SENSIT® SPODs will be placed at locations in Minneapolis where the community has indicated concerns for VOC levels and/or where the AQMesh sensors have detected levels of tVOCs. SENSIT® SPOD is a solar-powered sensor system that combines wind and air pollutant concentration measurements to detect VOC emission plumes and help locate the source of emissions. The SPOD user defines the required environmental conditions (ppb tVOCs) to trigger sample collection. This level will be determined in part by the previous year's collection of tVOC data using AQMesh. The air samples will be sent to a lab for a full TO-15 speciated sample analysis. Locations of Summa canisters may change month-to-month and will be based on the previous months' TO-15 and AQMesh tVOC data as well as sample locations desired by the community.

#### ***Step 3 – Empowering community voice in air quality monitoring***

The Green Zones advisory committees, residents across the city, local environmental groups, educational institutions, City staff, and MPCA staff will all be sharing knowledge and working together to understand what the current status of air quality is in the area. The main component of this project is ensuring that community partners and residents feel empowered by driving the data collection and taking the lead on disseminating information, educating residents, and engaging in conversations about what to do with the information collected.

All data will be shared with the stakeholders and displayed publicly on government websites as they are collected. The intention is to have complete transparency in data collection and understanding of the data collected by having a hands-on experience with residents taking ownership of the locations where sensors

are placed, and pollutants are monitored. As data are being collected, regular information sessions will occur with community groups to understand what the data mean. Community based organizations will convene and host the information sessions. Information sessions will cover the following topics: what data have been collected, what meaning can be made from these data, what health risks do the data show, and what actions can be taken to reduce air pollution.

The City and MPCA will be available to explain air sensor technology and data interpretation to community groups and residents on an ongoing basis. The Minnesota Department of Health (MDH) will be available to assist with health risk communications based on air pollution findings. MDH develops health-based guidance values to evaluate potential human health risks from exposures to chemicals in ambient air. According to the MDH, air guidance values may be used by the public, industry, state and local risk managers, and other stakeholders to assist in evaluating potential health risks to people from exposures to a chemical in air. MDH will communicate how these values can be used for assessing risks and the City will explain how comparing results to these values helps determine best actions to reduce air pollution.

There has been a long history of distrust between impacted residents and government agencies. By collaborating on a community air monitoring project where community members are the resident scientists collecting the data and observations of odors and proximate activities, we hope to improve trust and establish long-term relationships.

## **B. Project Significance**

For many years, concerned community members from the City's environmental justice neighborhoods have asked for more and better information about hyper-local air pollution. They have shared experiences of pungent odors, headaches, asthma, and other health and quality of life concerns. Both Northside and Southside Green Zones have developed 5-year work plans and each work plan has extensive sections on air pollution recommendations and action items (source: <https://minneapolismn.gov/greenzones>)

The Green Zones advisory committee members and other residents of Minneapolis have expressed concern about levels of air toxics, in particular VOCs, in their neighborhoods. According to the MPCA, people exposed to emissions of air toxic pollutants at sufficient concentrations and durations may have an increased chance of developing cancer or experiencing other serious health effects. VOCs are one of the three types of air toxics that the MPCA has determined are particularly important for Minnesota.

This project came about following requests in 2020 from the Green Zones advisory committee to understand how the disproportionate impact of COVID-19, a respiratory disease, on Black, Indigenous, and People of Color (BIPOC) communities was magnified because of existing levels of air pollution and respiratory diseases like asthma and COPD. The MPCA, MDH, and MHD shared a presentation in 2020 that showed air pollution was improving but still disproportionately higher in the Green Zones environmental justice neighborhoods, where a majority of residents are BIPOC, renters, and have lower incomes. The presentation also showed how few air monitors there are in the city, limiting our understanding of the true impact of air pollution on residents. Following the presentation, in fall 2020, Green Zones members invited MPCA and the City to continue conversations about how to obtain better data on local air pollution and take action to reduce air pollution through regulation, policy, programs, and incentives.

In 2021, MHD received funding through the American Rescue Plan Act (ARPA) which freed up some local one-time resources for community air monitoring. During initial community air monitoring project meetings, community members highlighted that air pollution from local businesses and facilities, residential sources (i.e. gas lawn equipment), traffic, wood burning, and idling vehicles were some of the main concerns. Since most of these are local neighborhood issues, where emissions may not necessarily be



captured by the closest regulatory monitors, it was decided that monitoring at a hyper-local level with sensors would be the best method of collecting these data. Data will be publicly available, making it easy for anyone to see and understand what the current levels of air pollution are in a given neighborhood.

From 2013 to 2015, VOC data were collected by MHD and analyzed through TO-15. At that time, sample locations were evenly spaced throughout the City, but in randomly decided locations within the even grid. Samples were collected four times per year, at the same locations, and were not influenced by tVOC levels as neither SPODs nor AQMesh were available. The focus was on ambient levels of VOCs across the City. This current proposal explicitly focuses on environmental justice and areas of identified concerns decided by residents.

There are several prominent industries in and near the Green Zones communities, including a metal recycling facility, two asphalt shingle producers, an asphalt surface producer, a foundry, a metal finisher, a printer, industrial cleaning facilities, a garbage incinerator, and energy production. The City of Minneapolis receives daily complaints from residents regarding odors from these facilities and concerns about exposures to emissions. There are also many neighborhood sources adjacent to residences. According to the MPCA, neighborhood sources, which are small and widespread sources such as dry cleaners, gasoline service stations, automotive shops, residential wood combustion, and personal gas-powered lawn equipment are the largest portion of overall emissions in Minnesota.

Other than large industrial sources and neighborhood sources, traffic related air pollution is one of the major sources of exposure in urban areas and has been associated with a wide variety of adverse human health effects. Much of the City of Minneapolis is exposed to a disproportionate amount of air pollution because of the historical segregation of neighborhoods and construction of freeways through neighborhoods. VOCs and fine particles are a main concern for areas constantly exposed to traffic.

The City of Minneapolis is a densely populated urban area with some areas having a disproportionate burden of air pollution and higher levels of odor complaints from surrounding sources. Better understanding of the chemical air profile around areas of concern and those with odor issues and studying surrounding sources in Minneapolis will provide necessary data for assessing differences in communities of concern and determining solutions.

## **Section 2 – Community Involvement**

### **A. Community Partnerships**

The primary partners in this proposed project include members of the Minneapolis Green Zones advisory committees; residents, businesses, and educators who are volunteering to host PurpleAir sensors and/or have requested locations for placement of AQMesh sensors. The City is also partnering with community-based organizations (CBOs) who will be recruited to provide education and engagement with community members. MHD and the Sustainability Division have relationships with many CBOs and will leverage those connections to solicit applications for a competitive review process for education and community engagement subawards.

To date, the City has hosted four community air monitoring conversations with Green Zones members, residents, businesses, and educators to develop the project proposal and identify sites for air monitoring. In addition to the City's outreach, the CBOs will reach more impacted community members, better understand how the data should be shared, and develop discussion questions to get to meaningful dialogue between community and government partners. The City will provide subawards for CBOs that serve priority communities including, BIPOC, immigrant, renters, and households with lower incomes that are in the Green Zones and other marginalized and overburdened communities.

One CBO has already expressed interest in this work. The Northside Safety NET (led by the non-profit Environmental Initiative) is an environmental career program focused on youth from North Minneapolis. The Northside Safety NET is a public-private-nonprofit partnership that develops student interns' skills around environmental justice issues through hands on activities and community projects. The students from this group that will be working on the project will learn basic skills of working with sensor technology and data interpretation. They will also engage in community-led meetings to discuss ongoing results and data interpretation. They will assist in developing education and outreach materials around common sources of pollution for the monitored suite of pollutants, common health effects, and what individuals can do to promote healthy air quality.

Other organizations the City may work with include neighborhood organizations, networks of environmental justice organizers, youth-based organizations working on climate justice, schools, educators, etc. Some of these partners are already engaged in conversations around the community air monitoring project. The City will support continued relationships and collaboration beyond the EPA funding through ongoing initiatives like the Green Zones advisory committees and leveraging City resources.

## **B. Community Engagement**

Engagement of the community members has been foremost in the planning and design of this project. The City has already engaged over 100 residents and community members through four community meetings and the request for community members to host PurpleAir sensors. The City plans to continue a series of monthly or bimonthly meetings until community-based organizations are brought on to lead the education and engagement.

As soon as the PurpleAir and AQMesh sensors are placed and activated, the City and MPCA will be hosting the live data on a public website for anyone to access. In 2023, the City will be partnering with MPCA to consolidate the collected data into a cloud-based platform to display data from all air sensors (PurpleAir, AQMesh, and TO-15) on one display through ArcGIS Story Maps. Additionally, the data can be downloaded and analyzed by anyone with the requisite skills. The City, MPCA, and MDH will provide CBOs and residents with the support necessary to make meaning from the data. Staff intend to attend all meetings hosted by the CBOs to answer questions, beyond providing technical assistance in meeting preparation and data sharing.

In addition to education and engagement, the City will also launch a survey in spring 2022. The survey will ask project participants and other interested individuals how they perceive air quality in their neighborhood and home. At the end of the project, a similar survey will be administered to see if perceptions have changed based on the availability and transparency of hyper-local air pollution data. The pre- and post-intervention survey will be analyzed by MHD's Research and Evaluation team. Results will be shared publicly, and they will help drive the City's work on addressing air pollution concerns.

This EPA grant is coming at the perfect time to build on momentum from the past few years of work with the Green Zones members. It will provide the City with resources to engage impacted residents who have been pushing to create a project that can be useful for them in the long term to answer questions based on data. The impetus for applying for this grant is to continue to collect meaningful data and explore sources and air quality issues in the communities based on this data.

## **Section 3 – Environmental Justice and Underserved Communities**

Black, Indigenous and people of color and residents with lower incomes in Minneapolis experience unequal health, wealth, employment, education outcomes, and also are overburdened by negative environmental

impacts. This burden is a cumulative effect of a variety of factors, including locations of stationary pollution sources and major roadways, quality of housing leading to poor indoor air quality, greater incidences of asthma emergency room visits and hospitalization rates, and higher rates of childhood lead poisonings (CEED 2020, Bobeldyk et al. accessed April 2020, Mapping Prejudice 2020, MDH 2020).

The Green Zones were formed out of the Minneapolis Climate Action Plan (CAP) as deemed necessary by the CAP's Environmental Justice working group. The Green Zone is a place-based policy initiative aimed at improving health and supporting economic development using environmentally conscious efforts in communities that face the cumulative effects of environmental pollution, as well as social, political, and economic vulnerability. The Minneapolis 2040 Comprehensive Plan provides the City's first definition of Environmental Justice and policy guidance:

*"The City of Minneapolis defines environmental justice as the right to a clean, safe, and healthy quality of life for people of all races, incomes, and cultures. Environmental justice emphasizes accountability, democratic practices, remedying the historical impact of environmental racism, just and equitable treatment, and self-determination."*

Source: <https://minneapolis2040.com/policies/environmental-justice-and-green-zones/>

The Green Zones are environmental justice areas as identified by the EPA's EJSCREEN tool (Figure 1). The Green Zones are also in the highest percentile areas in both Minneapolis and the State of Minnesota for PM2.5 (Figure 2) and ozone levels in air as well as air toxics cancer risk (Figure 3) and respiratory hazard index (HI) (Figure 4). Residents and organizers in the Minneapolis Green Zones have been the priority audience for the community air monitoring project. At each meeting they continue to emphasize the importance of prioritizing monitoring and pollution reduction projects in these overburdened environmental justice areas. The City has begun to and will continue to target its resources and policymaking to these areas, working in collaboration with impacted residents and businesses.

## Section 4 – Environmental Results – Outcomes, Outputs and Performance Measures

### A. Expected Project Outcomes and Outputs

Expected outputs will include regular meetings hosted by the City or CBOs with community members and residents; data collection, including air pollution and community members' perceptions (through survey tool); data dissemination through City and MPCA website updates (the City and MPCA will partner on the development of the ArcGIS story map); educational opportunities with residents by CBOs; identification of solutions to mitigate air pollution based on data and local community knowledge; and completion of required reports to document the project for the EPA. Some of the solutions to mitigate air pollution may include leveraging the Minneapolis Green Cost Share program for voluntary mitigation, placing additional MPCA regulatory monitors, advancing policy changes at the City, and partnering with other City and State departments to address sources such as vehicle traffic through promotion of multimodal transport and mobility hubs. The table below describes the project outputs, short-term outcomes, and longer-term outcomes of this project.

	Output	Short Term Outcomes	Longer Term Outcomes
<b>Engagement</b>	Monthly or bimonthly meetings with community members	- Increase awareness and knowledge of sensors and other technology available for community science and air quality measurements.	- Better outreach to industries and businesses.
<b>Data Collection</b>	- Speciated VOCs collected from 30 TO-	- Identify hot spots and understand source contributions. For example,	- Data driven approach to air pollution

	<p>15 monitors at dozens of sites across the Green Zones and Minneapolis over 2 years</p> <ul style="list-style-type: none"> <li>- Pre- and post-survey results on community members' perceptions of air pollution/quality</li> </ul>	<p>if data show us high levels of total volatile organic compounds (TVOCs) at a location over time, we can use TO-15 to speciate the VOCs</p>	<p>reduction work in Minneapolis. Data presented to City Council will help City staff work towards continued focus on pollution reduction efforts.</p>
<b>Data Sharing</b>	<ul style="list-style-type: none"> <li>- Public display of data online</li> <li>- Creation of an ArcGIS Story Map</li> <li>- Availability of data for public and researchers to analyze</li> </ul>	<ul style="list-style-type: none"> <li>- An increase in trust and accountability through transparent data sharing and availability.</li> </ul>	<ul style="list-style-type: none"> <li>- Will lead to ongoing conversations between government, non-profit, businesses, and community about air quality.</li> </ul>
<b>Partnerships</b>	<ul style="list-style-type: none"> <li>- Subawards with CBOs</li> <li>- Support from MPCA, MDH, and Sustainability</li> </ul>	<ul style="list-style-type: none"> <li>- Agency for residents and community regarding local air quality and exposures to air pollution that is often inaccessible.</li> </ul>	<ul style="list-style-type: none"> <li>- More opportunities for facilities (small businesses and regulated parties) and their neighboring communities to connect</li> </ul>
<b>Education</b>	<ul style="list-style-type: none"> <li>- Materials about air pollution, health risks, etc. created by CBOs with support from the City</li> </ul>	<ul style="list-style-type: none"> <li>- Help communities understand air quality data and pollution sources and possible actions that can be taken. For example, a participant may notice a spike on their PurpleAir monitor when a neighbor is having a backyard fire. Or observational data recorded and compared to AQMesh data may show an increase in tVOCs when a neighbor is using gas- powered lawn equipment.</li> </ul>	<ul style="list-style-type: none"> <li>- Decrease in air pollution and exposures from neighborhood sources.</li> </ul>
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>- Identification of strategies to reduce air pollution (policy, programs, regulation, incentives)</li> </ul>		<ul style="list-style-type: none"> <li>- Green Cost Share projects</li> <li>- Mini grants for neighborhood sources, such as landscaping equipment</li> <li>- MPCA for Small Business Environmental Improvement Loans</li> <li>- Policy changes</li> <li>- Pollution control technology</li> </ul>
<b>Reporting</b>	<ul style="list-style-type: none"> <li>- High quality reports delivered on time to EPA</li> </ul>		

Most of this proposal has focused on the elements of partnership, engagement, data collection and analysis, and education. All of that work is in service of understanding how to mitigate air pollution in Minneapolis, especially in EJ communities. The City and MPCA have some tools already identified and regularly focus on a combination of incentives for voluntary actions and policy changes. Here are some more details of the examples included in the table:

- The Minneapolis Green Cost Share (GCS) Program helps fund businesses adopting innovative business practices and processes that reduce air pollution and greenhouse gas emissions. Data may indicate areas, businesses, and chemicals where we can focus our Green Cost Share funding.
- Policy Change: In 2016, after a 2-year VOC study comparing results to MDH health-based guidance values, the City of Minneapolis became the first jurisdiction in Minnesota to ban the use of tetrachloroethylene in dry cleaners. This was supported by our Green Cost Share Program.
- Outreach to businesses and industries: The City of Minneapolis currently works with Environmental Initiative (EI) and the Environmental Justice Coordinating Council (EJCC) to conduct outreach to businesses during which they share information about the GCS program and connect the facilities to resources to help them evaluate pollution reduction projects. Data give outreach workers more information about emitters' effects on local air quality to share during outreach.
- MPCA offers a program similar to the Green Cost Share called the Small Business Environmental Improvement Loans which can be used in combination with other funds.
- MPCA addressing odor issues at facilities and encouraging them to control these at the sources by use of appropriate technology. Knowing the chemical speciation of odors will also help facilities with seeking out proper control equipment and periodically checking efficiencies.

## B. Performance Measures and Plan

Performance will be tracked based on the timeliness of meeting milestones, documenting challenges or barriers to accomplishing project tasks, and the achievement of community-identified performance measures. To ensure the community members and organizations involved are satisfied with the project and we can measure progress and performance according to their metrics in addition to the City's, we will take time early in 2023 to develop a set of performance measures, which will be reported on in quarterly EPA reports (as applicable) and in the final project report at the end of two years. Additionally, the City will keep detailed record of expenditures and document invoices and bills.

## C. Timeline and Milestones

Activity	2023				2024				2025	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Recruit community-based organizations (CBO) in Q1 '23 and sign subawards in Q2 '23.										
Collect speciated VOC air samples. Each month Summa locations will be reassessed.										
Collect observations from sensor hosts. Reporting will be requested quarterly to compare with data collected.										
Develop public-friendly data visualization platform (ArcGIS Story Map)										
Statistically analyze data and draw insights										
Teach data analysis methodology to CBOs and draw insights										

Develop educational materials (CBOs leads)										
Host series of community education and engagement events (CBOs leads)										
Communicate process and results with community members (CBOs leads)										
Identify emission reduction activities with community members										
Prepare / submit quarterly progress reports and detailed final report										

## Section 5 – Quality Assurance Statement

This section gives a brief overview of general quality assurance procedures for the study.

Sample or data collection will result from seven basic steps: (1) determine ambient monitoring sampler location (2) ambient monitor sampler deployment and maintenance ; (3) sample media collection and shipment to laboratory; (4) laboratory analysis for VOCs, (5) documenting of analytical results; (6) analytical quality assurance; and (7) data analysis.

Data analysis will occur in five basic phases: (1) basic exploratory statistics (means, ranges, distributions, upper confidence limits); (2) seasonal and monthly differences; (3) spatial mapping using a geographic information system and subsequent geospatial analyses to assess potential significant spatial differences; (4) comparisons of samples to previously available City of Minneapolis sample data at similar locations; and (5) validate past hot spot indications.

*Ambient monitor sampler deployment and maintenance* – Passive samplers will be checked for obvious fouling, tampering, blockage, etc.

*Sample media collection and shipment to laboratory* – Regulatory procedures for sample pickup and delivery will be followed (i.e. chain of custody, signing for samples, delivery to the point of contact at MPCA or Minneapolis, transferred in a cooled environment, etc.).

*Laboratory analysis for VOCs* – Contract labs with clear quality control objectives and national accreditation will be used.

*Documenting of analytical results* – Record keeping will follow agency protocols for transferring data between MPCA and the City of Minneapolis. As public agencies, all phases of this project will be documented and applicable to the Data Practices Act requiring all data collected by the government to be available to the public. This ensures transparency of our agency programs. Also, within the Data Practices Act is a subset requiring data collected by the government be accurate and complete so that appropriate decisions can be made that impact individuals (Minn. Stat. § 13.05, subd. 5(1); Minn. R. 1205.1500). When appropriate, internal and external peer review will be invoked in order to assure accurate results for later communication to interested community groups and stakeholders.

*Data evaluation and analysis* – Mathematical and statistical evaluations are important components in assuring data quality and will be conducted at various stages of data handling and records assembly. Internal and external consistency (presence of questionable data requiring further investigation such as extreme high maxima or extreme low minima), completeness (missing values), data treatment for below detectable values (method and analytical detection) and agreement between associated (e.g., duplicate, replicates) samples will be evaluated routinely as part of quality assurance procedures. Data records will be examined for range errors (e.g., missing or out of range), duplication errors, and type errors (e.g., numeric,

or alpha. Because there are opportunities for introduction of errors at every step in the data collection process, every precaution will be taken to ensure data integrity. Based on past experience with these types of data analyses, one important component of these checks would be to look at data as it comes in to catch any potential issues early on. Acceptance of collocated data will be based on the EPA's National Air Toxics Trend Sites (NATTS) program proposal of less than 25% bias between collocated samples. The other proposal of less than 15% coefficient of variation for each pollutant is not applicable to our proposal since we will be using one laboratory for chemical analyses. A detailed QAPP for each type of equipment and method used is provided as an appendix.

## **Section 6 – Programmatic Capabilities and Past Performance**

### **A. Past Performance**

The Minneapolis Health Department managed \$11,698,331 in State grant funds and \$43,237,145 in Federal grant funds 2021. The range of State and Federally funded projects cover many environmental program areas. Recent and related MHD and MPCA grants and projects are described below. Both the City and MPCA have experience with air monitoring including using PurpleAir and AQMesh sensors and TO-15 analysis.

- A. *Assessing Urban Air Quality*, MPCA (Financial support for this project is provided by the Environment and natural resources trust fund Subd. 07 Air Quality, Climate Change, and Renewable Energy ENRTF # 07b). (Grant period 7/1/17 – 6/30/21, Grant amount: \$700,000). MPCA has met all the project deadlines and has submitted all the required reports.
- B. *Air Quality in Minneapolis: A Neighborhood Approach*, Minneapolis Health Department (Project period 11/2013 – 8/2015). The City of Minneapolis Health Department has successfully completed this project on schedule and has met all applicable deadlines. The work products meet the expectations of this funding and reporting results to Minneapolis City Council was completed on schedule.
- C. *Fine Particulate Matter (PM2.5) Ambient Air Monitoring*, EPA Grant, MPCA (Project period: 4/01/2018 - 3/31/2020 \$922,934; 4/1/2020 - 3/31/2022 \$969,080). This is a multiyear grant that has been awarded to support the states on going fine particle ambient monitoring. All required deadlines and deliverables have been met in the past and the agency will continue to do so for the current grant as well.

### **B. Reporting Requirements**

Quarterly progress reports and a detailed final report will be submitted on time to EPA. Quarterly reports will include technical details about sampling and results, summary of community education and engagement, summary of expenditures, and plans for the following quarter.

### **C. Staff Expertise**

Jenni Lansing (MHD) – expertise on local pollution sources, areas of community concern, recent odor complaints, past air monitoring data in Minneapolis, and conducting local air monitoring projects.

Kelly Muellman (Sustainability) - expertise with genuine community engagement and collaboration to authentically include community in this work.

Eric Wilcox Freeburg and Monika Vadali (MPCA) - expertise on air sensor technology and data analysis that will be used in this project.

James Kelly (MDH) – expertise on communications for health risks from air toxics.

## Section 7 – Budget

### A. Budget Detail

Line Item and Itemized cost	EPA Funding
<b>Equipment</b>	
Replacement sensors 5 each for 30 AQMesh pods @ \$350/sensor	\$52,500
SENSIT SPOD Ion PID Sensor with Anemometer 30 units @ \$5,975/unit	\$179,250
<b>TOTAL EQUIPMENT</b>	<b>\$231,750</b>
<b>Contractual</b>	
TO15 sample analysis: 30 samples @ \$200 *21 months	\$126,000
Environmental Impact Lab Fee @ \$20 * 21 months	\$420
<b>TOTAL CONTRACTUAL</b>	<b>\$126,420</b>
<b>Other</b>	
Subaward costs	\$50,000
Community meeting logistics	\$2,000
Educational material development	\$1,000
<b>TOTAL OTHER</b>	<b>\$53,000</b>
<b>TOTAL FUNDING</b>	<b>\$411,170</b>
<b>TOTAL PROJECT COST</b>	<b>\$411,170</b>

### B. Reasonableness of Costs

A majority of the cost for this project will be going toward the lab analysis of air samples for VOCs and the SENSIT SPOD attachments for the Summa canisters. This is an integral part of the project because air toxics exposure, and in particular VOC exposure, has been expressed as an important issue by the community. To make the most effective choice for TO-15 sampling locations, the AQMesh tVOC sensors will be used for screening. The data from the sensors will provide information on where and when to sample. The SENSIT SPOD attachments are integral as they will guarantee that speciated VOC samples are only collected by the passive Summa canisters when the tVOCs in the air are above a threshold. This will ensure that all TO-15 samples are an optimal collection representing high occurrences of VOC levels at that location.

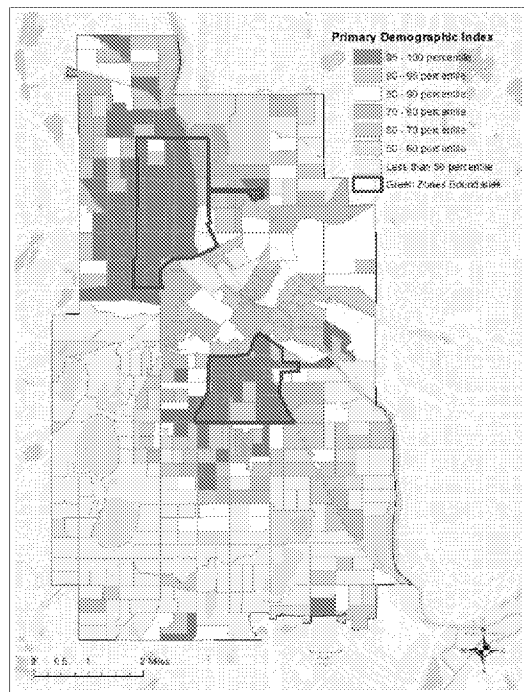
The City will use AQMesh pods owned by the MPCA for the project and in the spring of 2022 will pay for the reactivation of the pods. tVOC sensors will be purchased and faulty sensors will be replaced to ensure that the pods are optimally functioning. It is important to have replacement sensors ready to go as sensors fail so there is no disruption in the study.

### C. Expenditure of Awarded Funds

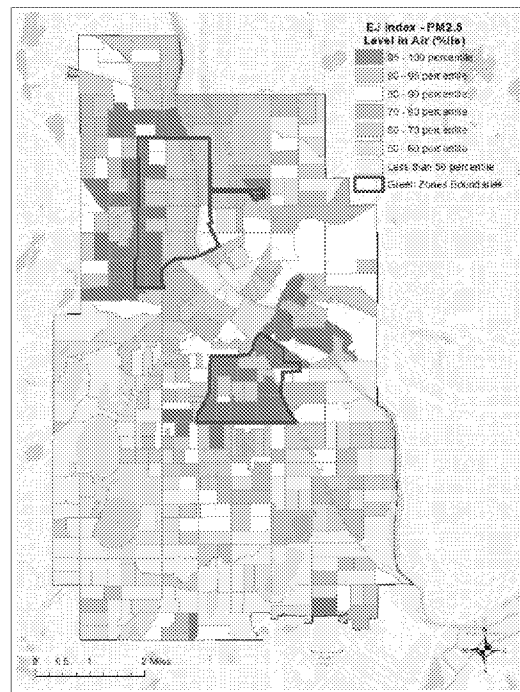
Within the first year, money will be spent on SPOD equipment, TO-15 analysis, and sensor replacements. Subawards will be allocated to CBOs for education and community engagement. Additional costs will be for developing educational materials and conducting community meetings.



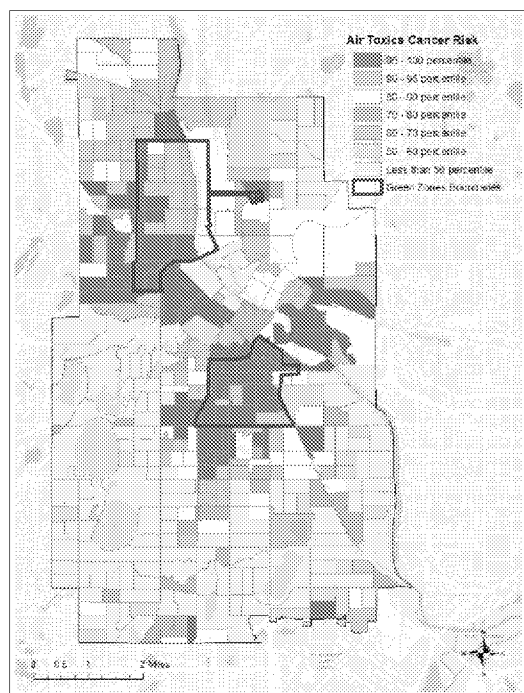
**Figure1: EPA EJScreen map showing the primary demographic index in Minneapolis and Green Zones**



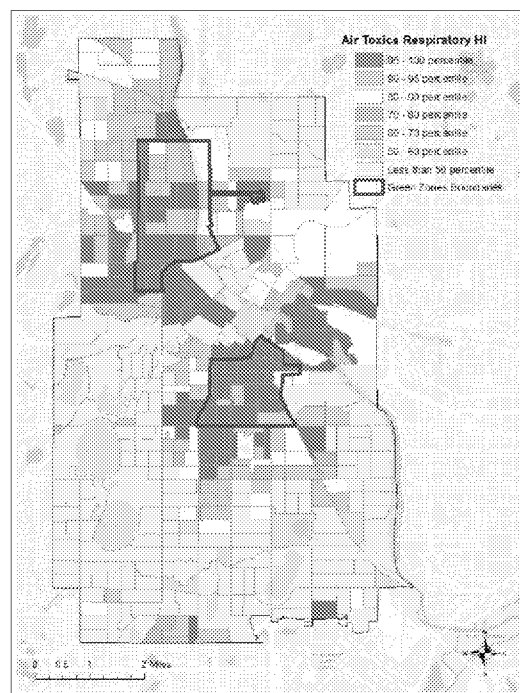
**Figure 2. EPA EJScreen map showing percentile (compared to State) of PM2.5 levels in air in Minneapolis and Green Zones**



**Figure 3: EPA EJScreen map showing air toxics cancer risk percentile (compared to State) in Minneapolis and Green Zones**



**Figure 4: EPA EJScreen map showing air toxics respiratory hazard index percentile (compared to State) in Minneapolis and Green Zones**



Documentation and data file source: <https://gaftp.epa.gov/EJSCREEN/>

**Eric D. Wilcox Freeburg, Ph.D.**  
Research Scientist – Minnesota Pollution Control Agency  
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#### EXPERIENCE/COMPETENCE

- Modeling activities for air toxics risk assessment in support of permitting action at the State level.
- Extensive experience building integration software solutions for client solutions bridging multiple applications and backend systems, including work in MS SQL Server, XML-based API, SSIS, PowerShell.
- Extensive experience in programming and debugging Python based power control and load balancing systems for smart grid technologies and methodologies.
- Extensive Python programming experience developing a graphical user interface and analytical tools for quantum cascade laser capillary absorption spectroscopy
- Extensive LabView programming enhancing data acquisition for quantum cascade laser capillary absorption spectroscopy
- Experience in instrumental method development on commercial platforms including: LA-ICP-MS, GC-MS, LC-MS, IRMS, SEM-EDS, LC-MS/MS, FTIR-ATR
- Experience in methods development for methane catalysis and aqueous dissolved gas capture for radioisotope analyses

#### ACADEMIC PREPARATION

School for the Environment, University of Massachusetts-Boston, Boston, MA

**Ph.D., Environmental Sciences**

**2009-2014**

Dissertation: “Exploring the Link between Otolith Growth and Function along the Biological Continuum in the Context of Ocean Acidification”

Luther College, Decorah, IA

**B.A., Chemistry**

**2003-2007**

Minor: Music

Thesis: “Phytochemical profiling of *Actaea racemosa* and *Sheng ma* and analysis of formononetin and actein by thin-layer chromatography and gas chromatography mass spectrometry”

#### APPOINTMENTS

Air Toxics Research Scientist, *Minnesota Pollution Control Agency*

**2020 – current**

Supporting environmental science advancements for the State and for the MPCA through program development, research, and support air toxics permitting through modeling activities. Additionally assists is data analysis and synopses for public release and engagement.

Developer, *TenDelta, L.L.C.*

**2018 – 2020**

Worked on a variety of projects including MS SQL Server back end data analytics, integration solutions for disparate data systems, front end panel design and deployment to meet client needs, PowerShell-based file management solutions, developed extensive Python-based configurable database generation and deployment scripts, PowerShell-based deployment scripts for SQL Server database solutions, SQL Server Integration Services modules for integration solutions

- Engineer II, *Pacific Northwest National Laboratory* **2017 – 2018**  
Programmed and debugged power control and load balancing systems for smart grid technologies and methodologies using a Python based real-time control system and assisted in the development of an ultrasensitive explosive vapor detection system. Was responsible for the design and development of an ionization chamber, including building 3D models in CAD, constructing electronic elements, and assisting in data analysis.
- Postdoctoral Research Associate, *Pacific Northwest National Laboratory* **2014 – 2017**  
Worked on a variety of projects including: quantum cascade laser-capillary absorption spectrometer (QCL-CAS) for C, O, and S stable isotope analysis software (Python, LabView) and hardware/methods development, methane catalysis method development to support shallow underground proportional counting, and moving wire introduction for non-volatile samples for isotope ratio mass spectrometry development (hardware and LabView software).
- NSF-CRI-OA Research Fellow, *University of Massachusetts Boston* **2012 – 2014**  
Designed and coordinated collaborative research between the University of Massachusetts Boston and Roger Williams University, including engineering experimental apparatus, software coding (Perl, Python), assisting in the development of general larval fish growout methods, and water quality analyses. Responsibilities included oversight and training of undergraduate assistants, including microdissection and SEM-EDS methodology.
- Graduate Exchange Research Fellow, *University of Massachusetts Boston* **March 2012**  
Cooperatively engaged in transdisciplinary research of ocean acidification effects on otolith growth processes and transcriptomic changes with Glasgow Caledonian University, Glasgow, Scotland. Responsibilities included training in otolith morphology determination via dissection scope images and marker development for differentiated expression analysis.
- Research Assistant, *School for the Environment, University of Massachusetts Boston* **2009-2013**  
Development of methods for laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS), scanning electron microscopy with energy dispersive spectroscopy (SEM-EDS), and gas bench isotope ratio mass Spectrometry (GB-IRMS) for analysis for a variety of solid sample types. Contracted analyses carried out for Core Analytical Facilities Laboratory, University of Massachusetts at Boston, and GeoMed Analytical, LLC., Boston, MA. Software development for offline data analysis was also completed in support of these analytical techniques (Excel, VBA, Python).

## PUBLICATIONS

- Ewing, Robert G., Valenzuela, Blandina R., Atkinson, David A., **Wilcox Freeburg, Eric D.**, 2018, Detection of Inorganic Salt-Based Homemade Explosives (HME) by Atmospheric Flow Tube–Mass Spectrometry. *Anal. Chem.* 2018, 90, 13, 8086–8092, DOI: 10.1021/acs.analchem.8b01261.
- Wilcox Freeburg, E.**, Rhyne, A., Bourque, B., Thlusty, M., Hannigan, R., 2013, A picture is worth 1000 words: image analysis tools for otolith studies, platform speaker, Larval Fish Conference 2013, Miami, FL
- Wilcox Freeburg, E.**, Rhyne, A., Bourque, B., Thlusty, M., Hannigan, R., 2013, Laboratory ocean acidification methodology using a hobbyist reef tank controller, poster, Larval Fish Conference 2013, Miami, FL

- Wilcox Freeburg, E.**, Rhyne, A., Robinson, W., Thusty, M., Bourque, B., Hannigan, R., 2013, A comparison of two systems for dosing CO<sub>2</sub> into marine aquaria, 2013, *Limnol. Oceanogr. Methods* 11:485-494, DOI: 10.4319/lom.2013.11.485.
- Wilcox Freeburg, E.**, Rhyne, A., Hannigan, R., 2011, "Aquarium acidification via CO<sub>2</sub> dosing and preliminary data concerning *Amphiprion clarkii*" Society of Environmental Toxicology and Chemistry Conference, 2011, Boston, MA
- Wilcox Freeburg, E.**, Brault, S., Mayo, C., Oktay, S., Hannigan, R., 2009, Whale baleen trace element signatures: a predictor of life history?, platform speaker, American Geophysical Union, San Francisco, CA.
- Wilcox Freeburg, E.**, Hannigan, R., 2008, Identification of Northern Snakehead breeding population using otolith chemistry, platform speaker, Midwest Fish and Wildlife Conference 2008, Columbus, OH
- Wilcox Freeburg, E.**, Hannigan, R., 2008, Fourier Transform Infrared Spectroscopy Microprobe Analysis of Calcium Carbonate Polymorph and Protein Distribution of Fish Earstones, poster, Geological Society of America Conference 2008, Houston, TX
- Wilcox Freeburg, E.**, Hannigan, R., Medina-Bolivar, F., 2007, Phytochemical profiling and marker development of black cohosh (*Actea racemosa*) and Sheng ma (*A. cimicifuga*) utilizing ultraviolet detection coupled high-performance thin-layer chromatography, poster, National Conference on Undergraduate Research 2007, San Rafael, CA
- Wilcox Freeburg, E.**, Hannigan, R., Medina-Bolivar, F., 2007, Extraction and identification of formononetin from black cohosh (*Actaea racemosa*) utilizing gas-chromatography coupled mass-spectroscopy and ultraviolet detection of high performance thin layer chromatography, poster, American Chemical Society Conference 2007, Chicago, IL

## REFERENCES

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Minnesota Pollution Control Agency, Saint Paul, MN

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Minnesota Pollution Control Agency, Saint Paul, MN

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**Dr. James Moran** ([james.moran@pnnl.gov](mailto:james.moran@pnnl.gov)), *Postdoctoral Mentor*  
Pacific Northwest National Laboratory, Richland, WA

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Clarkson University, Potsdam, New York

# JENNI LANSING

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## EXPERIENCE

### **Senior Environmental Research Analyst**

**City of Minneapolis – Health Department/Environmental Programs, Minneapolis, MN**

**10/2012-Present**

- Design and coordinate a Community Air Monitoring project to collect outdoor air quality data at the community level and indoor air quality data inside homes, schools, and cars (during commuting) using low-cost air sensors which will enable community scientists as well as City and State researchers to interpret air quality data in neighborhoods.
  - Work collectively with community, focusing in environmental justice areas, to plan this work around their needs and concerns.
  - Determine the best air sensor technology at each sample location based on air quality concerns.
  - Consistently communicate plans and timeline with the community, soliciting input and feedback, and adjusting as necessary.
  - Install air sensor technology at requested locations in Minneapolis.
  - Interpret and communicate results to community members, City leaders and decision makers, and Minnesota Pollution Control Agency scientists.
- Manage the Transient Non-Community Water System, Minnesota Department of Health Delegated program consisting of 24 public drinking water supply wells.
  - Test drinking water quality annually and after flood events near wells.
  - Conduct sanitary surveys on all wells every three years.
  - Analyze contamination potential and setback/isolation requirements from sewer and underground storage tanks using ArcGIS.
- Lead a Minnesota Department of Health Skin Lightening Education and Outreach grant for \$90,000 to educate young people ages 14 – 19 and their parents and families about the dangers of skin lightening products and practices and remove these products from the shelves of retailers in Minneapolis.
  - Supervise three staff assigned to this project.
  - Set and maintain the grant budget.
  - Coordinate all work on the grant which focuses on educational trainings and presentations, communications campaigns, and a buy-back program with Minneapolis retailers selling mercury containing skin lightening products.
- Bolster the Green Cost Share (GCS) program through evidence-based results showing before and after air quality effects. Reinforce GCS efforts through industrial outreach, emissions analysis, and regulatory programs.
  - Lead the efforts transition all dry cleaners in Minneapolis from using PERC through GCS funds.
  - Organizing upcoming ordinance requiring all automotive paint booths in Minneapolis to switch to waterborne or low-VOC products, supported with GCS funds.
- Facilitate the Well Construction, Repair, and Sealing Minnesota Department of Health Delegated program. Inspect wells permitted under this program and maintain compliance with expectations of this delegated agreement.
- Coordinate a Minnesota Pollution Control Agency Environmental Assistance grant funding of \$50,000 to reduce nail salon worker exposure to harmful chemicals associated with the industry.
  - Work with salons to implement ventilation modifications.
  - Analyze air samples taken in the salon before and after ventilation modifications to determine improvements in indoor air quality.
- Provide customer service to residents regarding land, air, and water pollution concerns. Conduct environmental sampling and data analysis for appropriate chemical complaints and concerns.
- Support the Lead Hazard and Healthy Homes team with data organization, analysis, and visualization. Develop maps for analysis and display using ArcGIS mapping.
- Supervise seasonal staff working on a Minnesota Department of Health Contaminants of Emerging Concern (CECs) grant in the amount of \$10,000 to educate communities about CECs. Facilitate seasonal staff learning new skills and responsibilities on project development, outreach, and community engagement.

### **Accomplishments**

- Served as the Planning Section Chief for 18 months on the City of Minneapolis Health Department COVID-19 response.
  - Coordinated response efforts of over 50 Health Department staff at a single time using the FEMA National Incident Management System.
  - Lead vaccination clinics and assisted with testing events.
  - Communicated our purpose, efforts, and COVID messaging with communities in Minneapolis.

- Sampled tetrachloroethylene at dry cleaners before and after their transition to newer technologies through the Green Business Cost Share Program. Analyze resulting levels of tetrachloroethylene in comparison to health benchmarks, worker exposure concerns, and neighborhood ambient air levels.
- Wrote policy language for Minneapolis 2040, the update to the City's Comprehensive Plan, which shapes the future development of Minneapolis. Member of the Environmental Systems Research Team and Team Leader for the Air Quality policy key direction.
- Led and managed the *Air Quality in Minneapolis: A Neighborhood Approach* study from 2013 - 2015. Developed the strategic plan for monitoring 62 different volatile organic compounds (VOCs), at 120 different locations, four times per year, for two years.
  - Assigned and monitored work of ten colleagues who assisted with the project. Supervised and trained 130 citizen volunteers who aided in data collection efforts. Liaison between Environmental Services unit, the City Council, the Commission, and the public. Presented information at public information meetings.
  - Identified potential sources of VOC pollution in Minneapolis and determined sample locations by analyzing road use data, air quality permits, pollution control registrations, and business licensing information with Geographic Information Systems (GIS) in ArcGIS.
  - Analyzed data obtained from the project, using ArcGIS, to determine levels, changes, and trends in VOCs across the City of Minneapolis. Examined populations affected by a higher exposure to VOCs with an emphasis on environmental justice / health equity, impacts on people of varying race, color, national origin, or income.
  - Wrote reports available to the City of Minneapolis leaders, City Council, and the public.
  - Created interactive web maps and applications in ArcGIS Online and coordinated the design of data in Tableau to publish open data from the project, making information transparent to the public.
  - Coordinated the development of land use regression models through Virginia Tech to model the spatial patterns of air quality and estimate concentrations at locations where measurements are not available.
  - Wrote results for submission to peer-reviewed journals.
- Sampled polycyclic aromatic hydrocarbons near an area of concern for potential emissions and analyzed resulting data in relation to source information.
- Managed the Minneapolis Ground Water project consisting of sampling for additional contaminants of concern at the 24 TNCWS public drinking water supply wells.
  - Sampling included a one-time screen for VOCs, semi-volatile organic compounds, pesticides, and metals in 2014; continual, annual sampling at each well for lead.
  - Coordinated multi-agency communication and work between the delegation authority, the Minnesota Department of Health; the delegated authority, the Minneapolis Health Department; and the owner of the well components, the Minneapolis Park and Recreation Board.
  - Created a template for spatial data collection in the Collector for ArcGIS mobile application to map all public drinking water sources. Distributed this dynamic, public interface for use by park users.

#### CERTIFICATIONS/TRAININGS

- |  |   |
|--|---|
| -Registered Environmental Health Specialist    | -Licensed Well Inspector                |
| -Hazardous Materials 40-Hour Waste Site Worker | -Underground Storage Certification      |
| -Lead Risk Assessor/Inspector                  | -Erosion Control Construction Installer |

#### PROFESSIONAL MEMBERSHIPS

- Minnesota Environmental Health Association (MEHA) – Current Legislative Committee Co-Chair and past Board Member at Large. Presenter at 2018 MEHA Spring Conference
- National Environmental Health Association (NEHA) – Presenter at 2019 NEHA Annual Education Conference
- Clean Air Minnesota (CAM) – Area Source Team member
- The Women of Minneapolis Employee Network (WOMEN)
- Minnesota Groundwater Association

#### EDUCATION

- |  |         |
|--|---------|
| Master of Science, Environmental Sciences<br>University of Colorado at Denver and Health Sciences Center<br>Denver, CO | 05/2006 |
| Bachelor of Science, Fisheries and Wildlife, Biology Minor<br>University of Minnesota<br>St. Paul, MN                  | 05/2000 |

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# KELLY MUELLMAN

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### WORK HISTORY

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05/2015 to Present **Sustainability Program Coordinator**

**City of Minneapolis, City Coordinator's Office** – Minneapolis, MN

- Manages the City's Green Zones initiative, a cross-cutting equity-centered environmental justice strategy
- Participates on the leadership team for the Energy Efficiency Cohort, a multi-stakeholder partnership to advance energy justice and reduce energy burden.
- Expands the City's consideration of climate adaptation and resilience through multi-sector collaboration
- Supervises Sustainability intern/Fellow/Program Aide as well as occasional student workers
- Represents the City at local, national and international gatherings of leading cities in sustainability and climate action
- Advances environmental justice and equity in sustainability program development and engagement

06/2011 to 05/2015 **Planner Principal**

**Minnesota Department of Health, Environmental Health Division** – Saint Paul, Minnesota

- Advanced the use of health impact assessments (HIA) in Greater Minnesota, Twin Cities metro and nationally
- Developed methodology for a statewide climate change vulnerability assessment
- Represented the state at local and national conferences
- Initiated an overhaul of the Climate and Health program website
- Cultivated close working relationships with other municipalities and governmental agencies
- Improved evaluation standards for projects and reporting for quarterly and annual grant reports.

01/2010 to 07/2011 **Community GIS Graduate Research Assistant**

**Center for Urban & Regional Affairs, University of Minnesota – Minneapolis, MN**

- Provided geospatial analysis of community resources and U.S. Census data for local organizations
- Analyzed economic and demographic data for the Local Initiatives Support Coalition (LISC) Sustainable Cities – Twin Cities program annual reports

**07/2010 to 02/2011 Community Planning Intern**

**City of Minneapolis, Community Planning & Economic Development (CPED) – Minneapolis, MN**

- Supported lead planning staff on the Above the Falls Policy Review and Implementation study
- Researched barging transportation infrastructure and systems prior to the closure of the upper lock and dam
- Assisted meetings with local river-front businesses to survey their needs and long-range plans

**03/2006 to 07/2009 Green Energy Intern/Green Energy Associate**

**Mass Energy Consumers Alliance - Boston MA**

- Managed customer support for two renewable energy programs to ensure customer satisfaction and timely payments
- Procured renewable energy contracts from small scale solar, wind and hydro applications to meet the needs of renewable energy customers
- Conducted wind speed data analysis as consultant for wind feasibility studies
- Supervised multiple interns over three summers

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**EDUCATION**

**Master of Arts: Urban and Regional Planning**

**University of Minnesota - Minneapolis, MN**

Chair of Planning Student Organization (PSO)

**Bachelor of Arts: Spanish**

**Northeastern University - Boston, MA**

Minor in Environmental Studies

Recipient of Dean's Scholarship

Honors: Summa Cum Laude, NEU Honor's Program

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**CERTIFICATIONS**

- American Institute of Certified Planners (AICP)



## **SUMMARY**

With extensive expertise in air quality research and related risk assessment, I am always looking for avenues to understand and incorporate system level changes at the intersection of science, research, equity and policy. I am a detail oriented, consistent problem solver skilled at prioritizing and managing projects with proficiency. Empowering people with knowledge and providing them with the tools and resources they need, in an equitable fashion, is a passion that drives me to do innovative research and designing programs like creating an Air Sensor program at my current work place. Being a published author, I enjoy collaboration and the curiosity to learn from others as well as share my qualitative and quantitative research skills has always kept me on top of my game.

I contribute critical thinking, engagement, and innovation toward team efforts and business improvements. I am a self-starter and my inquisitive nature and passion for my work motivates me to thrive well either as an individual contributor or as a team player.

In my free time I enjoy getting involved with local governance and community issues. I am currently serving as a Commissioner on the Environmental Quality Board and a Watershed management division in my city.

## **KEY SKILLS**

- Research, analysis and effective presentation
- Community outreach and engagement
- Effective scientific communication to varied audience
- Air Quality Sensors/ Air pollution
- EMS, ISO 14001, Six Sigma, Kaizen CI
- Environmental audits and report writing
- Environmental Risk assessment
- Environmental review
- Exposure modeling experience using Bayesian techniques, R,SAS, Monte Carlo methods, AERMOD
- Chemical exposure assessment
- Developing and delivering health and safety training
- FAA certified drone pilot

## **PROFESSIONAL EXPERIENCE**

### **Environmental Research Scientist Minnesota Pollution Control Agency**

**2013 – Present**

- Project manager for Air pollution sensors program
- Project Manager on LCCMR Grant to plan, implement and deploy a network of air pollution sensors across the cities of Minneapolis and St.Paul
- Data Analysis for data monitoring projects
- Project manager for state wide Air Quality Index program, responsible for budgeting, planning and continuous improvement project
- Project manager for planning, budgeting, implementing and updating the state wide health risk screening tool for modeling health impacts from pollutants in air
- Conduct technical review of risk assessment and air toxics reports for facilities seeking an Air permit, to evaluate potential human health effects from exposures before issuing a state permit
- Guide and collaborate with consultants in implementing the guidance for Air Emissions Risk Analysis
- Develop and update risk assessment procedures as and when required with changes in EPA guidance
- Monitor and identify high risk facilities based on their emissions of pollutants and potential harm caused due to exposure
- Work with consultants/ facilities to develop ways to reduce emissions
- Periodically conduct air modelling of facility air toxics emissions to review human health effects
- Work on joint projects and collaborations with department of health, city of Minneapolis, Xcel energy and other government/private entities

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- Conducting occasional public outreach work connecting with communities/schools to discuss air quality and related issues

**Public Health Specialist**

**University of Minnesota**

2011 – 2012

- Review, update and deliver research safety training based on changes in regulations, university policies and best practices
- Review Lab safety plans and audit checklists periodically to promote an effective lab audit process
- Lead EHS internal lab audits for compliance and complete regulatory reports
- Develop, implement and maintain EHS procedures for new processes
- Developing a database management tool to track and assess the impact of lab audits and training, to establish priorities and initiatives to enhance research safety
- Collect and analyze EHS data for lab specific metrics
- Conduct chemical exposure monitoring to identify high risk processes and determine appropriate preventive measures.
- Accident and injury investigation and record keeping
- Participate as a member of university emergency response team

**Consultant**

**3M, Minnesota**

2009 – 2011

- Evaluate workers health risk by applying tier 1 and tier 2 exposure models for risk assessment purposes to follow REACH guidelines
- Provide training to hygienists for using exposure models. Models used are ECETOC TRA, ConsExpo, ART tool and Near-field Far-field model.

**Program co-coordinator**

**Swabhimana, Bangalore, India**

2002 - 2003

- Integrated waste management system (ISWM)

The projects main goal was to develop a planned and systematic approach for the collection, transfer, transport and disposal of solid waste for Bangalore city. Emphasis was on segregation and separate collection of dry and wet waste and recycling

- Supervised the development and implementation of a pilot project for domestic solid waste collection in apartment complexes
- Prepared a set of rules, regulations and guidelines for the implementation of ISWM
- Prepared cost benefit analysis for transportation economics of solid waste collection to dump sites
- Conducted time motion studies for collection, transfer and transport of solid waste
- Conducted educational sessions in schools to raise awareness of solid waste management
- Planned and coordinated meeting with resident associations and government officials
- Prepared reports, presentations, and compliance documents

**Junior Environmental Scientist**

**GE John F Welch Technology Center, Bangalore, India**

2001-2002

Worked with the EHS team and involved in hazardous waste management and over seeing the waste water treatment facility, ergonomics and worker safety.

- Conducted IH surveys of research labs and personal air sampling of workers to identify sources of exposure and ensure use of appropriate PPE
- Conducted audits of research labs to monitor hazardous waste management protocol and ensure regulatory compliance
- Oversee the operations of incinerator and waste water treatment plant and periodic water quality testing
- Conducted ergonomic audits and provided training to employees on good ergonomic practices to reduce incidence
- Worked with the EHS team on six sigma projects, especially with process mapping and data analysis

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**RESEARCH EXPERIENCE**

- **Graduate Research Assistant - 1** 2008 - 2010  
Minnesota Taconite Workers Lung Health Partnership. University of Minnesota
  - Developed a job exposure matrix based on retrospective exposure monitoring data
  - Visited mines to study current operating procedures
- **Graduate Research Assistant - 2** 2005 - 2008  
Expert decision making in exposure assessment. University of Minnesota
  - Developed a Bayesian model for exposure management and risk assessment
  - Developed a 2 dimensional Monte Carlo method for modeling occupational exposures
  - Investigated the effect of training on accuracy of hygienists exposure judgments
- **Graduate Teaching Assistant** 2005 – 2006  
Issues in Environmental and Occupational health, online course. University of Minnesota
  - Taught undergraduates as well as graduate students
  - Prepared and graded assignments and tests
  - Assisted in course development with both course material and the online environment
- **Graduate Research Assistant - 3** 2004 - 2005  
The influence of electric charge on filtration of an airborne biological agent.  
University of Minnesota
- **Research Assistant** 2000 – 2001  
Use of Poly aluminum chloride as a substitute for Alum in industrial waste water treatment.  
Water Tec International, Mysore, India.
- **Intern** 1997 – 1998  
Environment awareness through action oriented projects for schools (EAAPS).  
Tata Energy Research Institute, Bangalore, India

**EDUCATION**

- **Master of Public Affairs** (2021-2023)  
Humphrey School of Public Affairs  
University of Minnesota
- **Doctor of Philosophy** in Environmental health 2005 -2010  
University of Minnesota, Minneapolis, Minnesota  
Degree awarded: December 2010
- **Diploma in Environmental Management and ISO 14001** 2001 - 2002  
AIIMAS, Chennai, India.  
Degree awarded: March 2002
- **Master of Science** in Environmental Studies 1999 – 2001  
University of Mysore, Manasagangotri, Mysore, India.  
Degree awarded: June 2001
- **Bachelor of Science** in Environmental Science 1996 – 1999  
Mount Carmel College, Bangalore, India.  
Degree awarded: June 1999

**PROFESSIONAL AFFILIATIONS/COMMITTEES**

- Commissioner, Environmental Quality Board, City of Plymouth (2022 – 2025)
- Alt commissioner, Bassett Creek Watershed management division (2022 – 2025)
- American Industrial Hygiene Association – Member since 2006
- Student local section, University of Minnesota Industrial Hygiene Twin Cities Section., Member since 2007, Vice president (2007-2008)
- University of Minnesota Alumni Mentor program – Member since 2010

**MONIKA L. VADALI, Ph.D.**  
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**PUBLICATIONS**

- **Vadali, M.**, The effects of air quality: Understanding the metrics, Minnesota Health care news, (2015)  
[http://issuu.com/mppub/docs/mn\\_healthcare\\_news\\_nov\\_2015](http://issuu.com/mppub/docs/mn_healthcare_news_nov_2015)
- Gregory C Pratt, **Monika L Vadali**, Dorian L Kvale, Kristie M Ellickson., Traffic, air pollution, minority and socio-economic status: addressing inequities in exposure and risk, Int J Environ Res Public Health (2015)
- Ramachandran, G., **Vadali, M.**, Sudipto Banerjee, Jennifer Sahmel. Bayesian Hierarchical Framework for Occupational Hygiene Decision Making. Annals of Occupational Hygiene. AnnHyg-14-0004,(2014)
- **Vadali, M.**, Ramachandran, G., Mulhausen, J.R, Sudipto Banerjee. Effect of training on exposure judgment accuracy and agreement among industrial hygienists. Journal of Occupational and Environmental Hygiene. , 9:4, 242-256 (2012).
- **Vadali, M.**, Ramachandran, Sudipto Banerjee. Effect of training, education, professional experience and need for cognition on accuracy of exposure assessment decision making. Annals of Occupational Hygiene, In press, November 2011.
- **Vadali, M.**, Ramachandran, G., Mulhausen, J.R. Exposure Modeling in occupational hygiene decision making. Journal of Occupational and Environmental Hygiene. 6 (6): 353-362 (2009)
- **Vadali, M.**, Ramachandran, G., Mulhausen, J.R., P Logan. Mathematical models for estimating Occupational exposures to chemicals, 2<sup>nd</sup> edition, 2009, AIHA publication. Chapter 11.
- **Vadali, M.** Greening and importance of trees in the urban environment. Guide to good citizenship [Citizens handbook, Bangalore, India]. (2003)

**PRESENTATIONS**

- Panel presenter: Assessing urban air quality project. Air Sensors International Conference, Summer virtual series, 2020
- Panel presenter: Environmental Health: Is there justice for all? In the air we breathe, Minnesota Public Health Associate, 2020
- Podium presentation: A cost effective ambient air quality monitoring system for evaluating urban air quality. International symposium on Lasallian research, Minneapolis, Minnesota, 2018
- Poster presentation: Assessing urban air quality. Air sensors international conference, Oakland, California, 2018
- Poster presentation: Effect of Industrial Hygiene training on exposure judgment. ISES annual conference, Minneapolis, Minnesota, 2009.
- Podium presentation: Accuracy of Professional Judgment in Occupational Exposure Assessment. American Industrial Hygiene Conference and expo. Toronto, Canada. (2009)
- Podium presentation: Hierarchical Bayesian modeling for occupational exposure assessment. American Industrial Hygiene Conference and expo. Minneapolis, MN. (2008)
- Poster Presentation: Professional Judgment Using Bayesian Inference. American Industrial Hygiene Conference and expo. Philadelphia, PA. (2007)
- Roundtable presentation: Use of models in expert judgment. American Industrial Hygiene Conference and expo. Chicago, IL. (2006)

Manifest for Grant Application # GRANT13579931

Grant Application XML file (total 1):

1. GrantApplication.xml. (size 29313 bytes)

Forms Included in Zip File(total 6):

1. Form ProjectNarrativeAttachments\_1\_2-V1.2.pdf (size 16039 bytes)

2. Form SF424\_3\_0-V3.0.pdf (size 24115 bytes)

3. Form SF424A-V1.0.pdf (size 22948 bytes)

4. Form EPA4700\_4\_3\_0-V3.0.pdf (size 22738 bytes)

5. Form OtherNarrativeAttachments\_1\_2-V1.2.pdf (size 15909 bytes)

6. Form EPA\_KeyContacts\_2\_0-V2.0.pdf (size 37354 bytes)

Attachments Included in Zip File (total 11):

1. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1236-Eric Wilcox Freeburg CV.pdf application/pdf (size 188794 bytes)

2. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1235-EI Letter of Support to Mpls 3\_22\_22.pdf application/pdf (size 184036 bytes)

3. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1238-Jenni Lansing Resume.pdf application/pdf (size 143280 bytes)

4. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1237-Green Zones Sustainability Letter of Support to Mpls 3\_23\_22.pdf application/pdf (size 186029 bytes)

5. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1234-Quality Assurance Plan V1.1.pdf application/pdf (size 976541 bytes)

6. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1243-AQMesh QA guidance.pdf application/pdf (size 621099 bytes)

7. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1240-MDH Letter of Support to Mpls 3\_21\_22.pdf application/pdf (size 120121 bytes)

8. ProjectNarrativeAttachments\_1\_2 ProjectNarrativeAttachments\_1\_2-Attachments-1244-City of Minneapolis Community Air Monitoring EPA Grant.pdf application/pdf (size 744046 bytes)

9. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1239-Kelly Muellman Resume.pdf application/pdf (size 112285 bytes)

10. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1242-MPCA Letter of support to Mpls 3\_23\_2022.pdf application/pdf (size 421891 bytes)

11. OtherNarrativeAttachments\_1\_2 OtherNarrativeAttachments\_1\_2-Attachments-1241-Monika Vadali Resume.pdf application/pdf (size 303324 bytes)

